

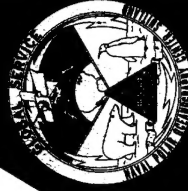
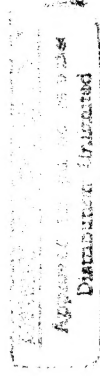
EASTERN—WESTERN ARCTIC SEA ICE ANALYSES 1991

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**PREPARED BY
NAVAL POLAR OCEANOGRAPHY CENTER
SUITLAND, MD**

**PREPARED UNDER AUTHORITY OF
COMMANDER, NAVAL OCEANOGRAPHY COMMAND
STENNIS SPACE CENTER, MS 39529-5000**

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FOREWORD

The U.S. Navy has a long and eventful history of polar exploration from Robert E. Peary in the Arctic to Richard E. Byrd in the Antarctic. In recent years the strategic importance and expanded research pursuits in these areas have resulted in greater national and international requirements for environmental information. Since 1976, the National Oceanic and Atmospheric Administration (NOAA) and the Navy have worked together at the Joint Ice Center (JIC) in Suitland, Maryland. By combining the Navy's experience in observing and recording sea ice data, and NOAA's expertise in satellite data collection and interpretation, the JIC has been able to keep pace with that demand in both polar regions.

This publication is the 18th edition of the Arctic sea ice atlases prepared by the JIC. The atlas contains weekly charts depicting Northern Hemisphere and Great Lakes ice conditions and extent. The significant use of high resolution satellite imagery, combined with valuable ice reconnaissance data from various sources, has greatly improved the accuracy of these analyses.

The purpose of this atlas is to provide the user with reliable weekly hemispheric ice analyses. Both Navy and NOAA personnel with considerable experience in sea ice analysis prepare the analyses. The following procedures have been developed to ensure the quality of the final products:

- a. Conventional shore station, ship and aerial ice reconnaissance observations are plotted and evaluated.
- b. Satellite data from different sensors is compared and analyzed for ice information content. Table I, located on the inside back cover, summarizes satellite data availability for 1991.
- c. A final product results from a. and b. However, where insufficient data is available, an estimated boundary will be depicted. Meteorological data and computer generated ice drift vectors are utilized to determine the estimated ice edge position.

NAVY/NOAA Joint Ice Center
Naval Polar Oceanography Center
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Washington, DC 20395-5180

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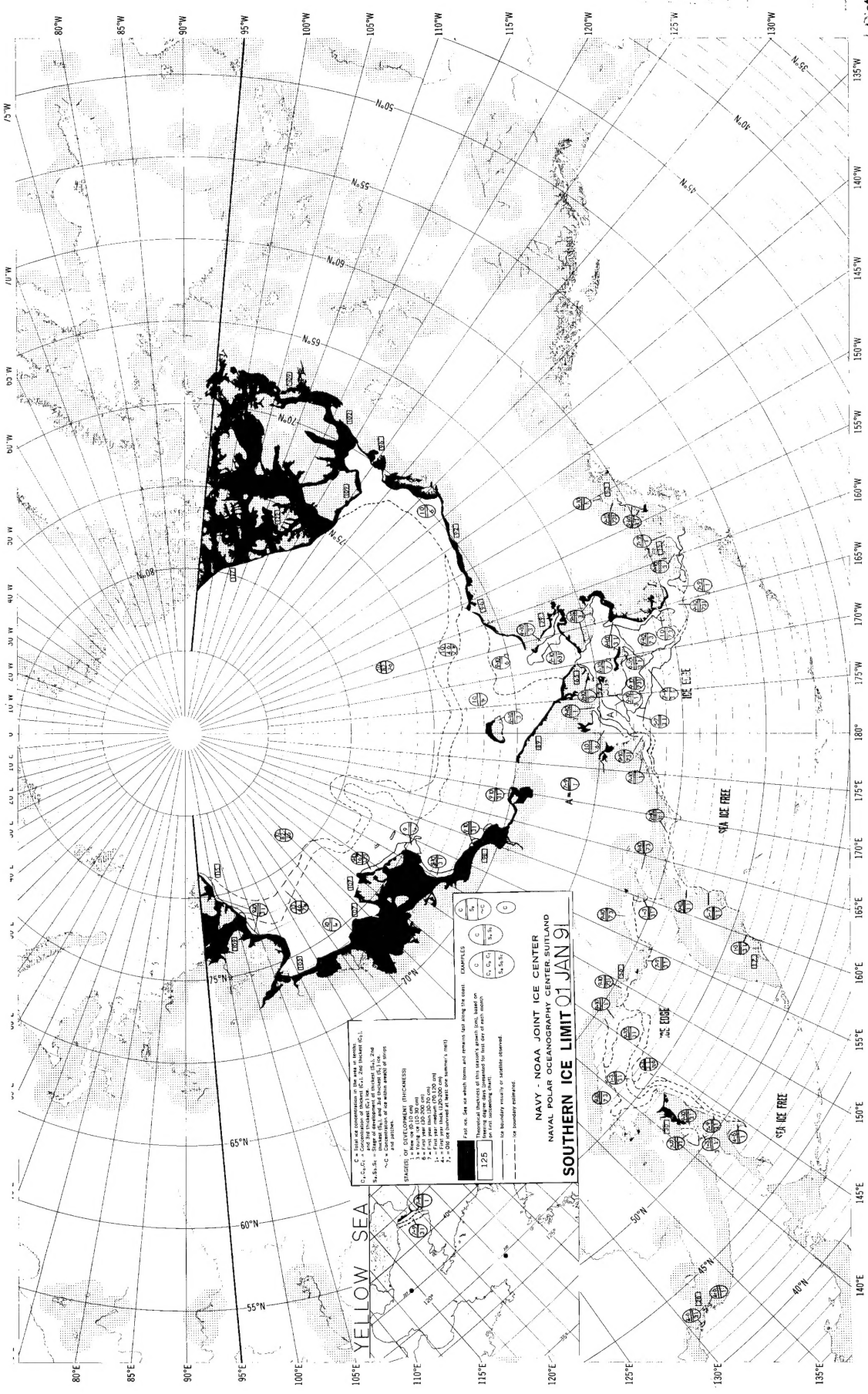
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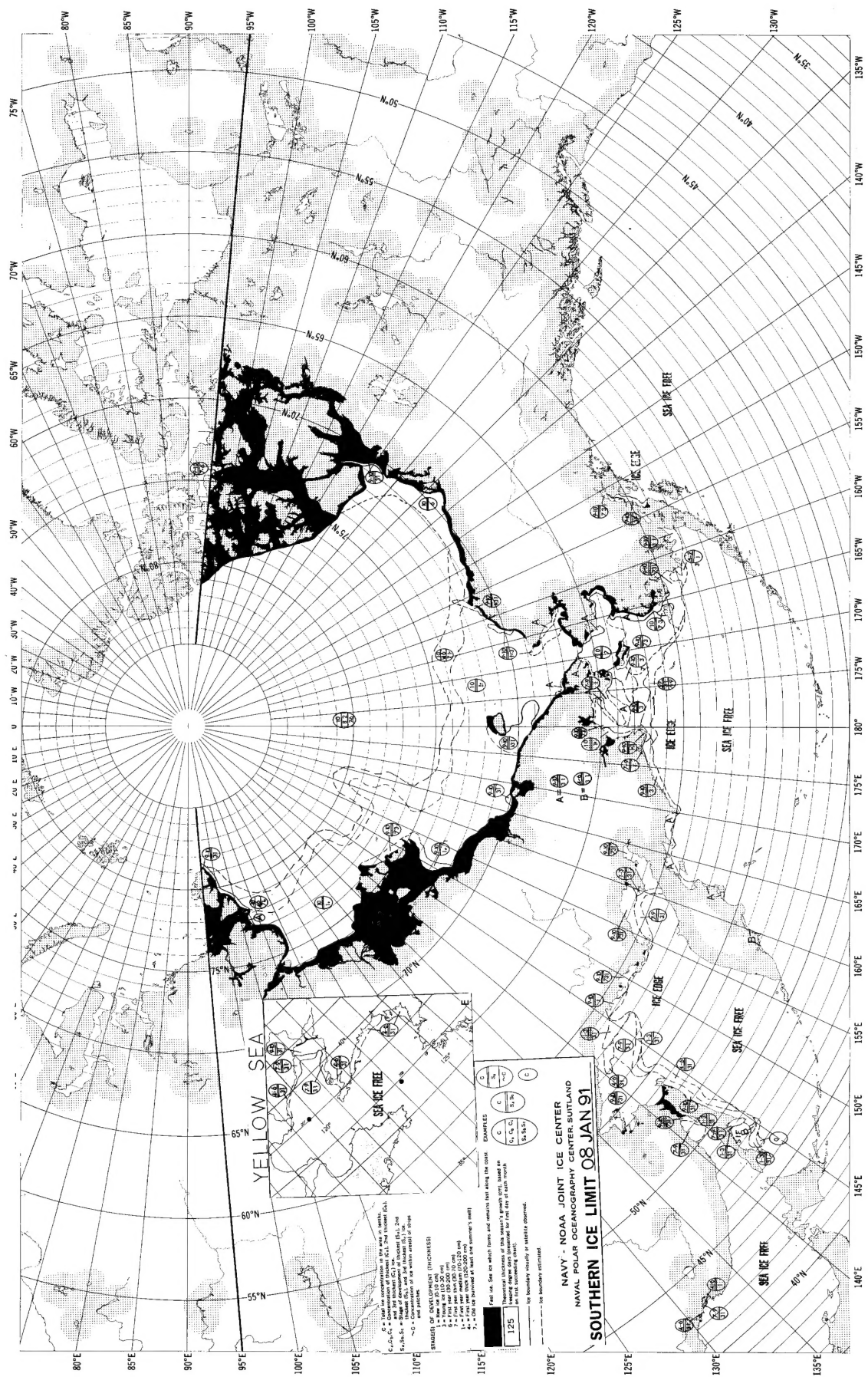
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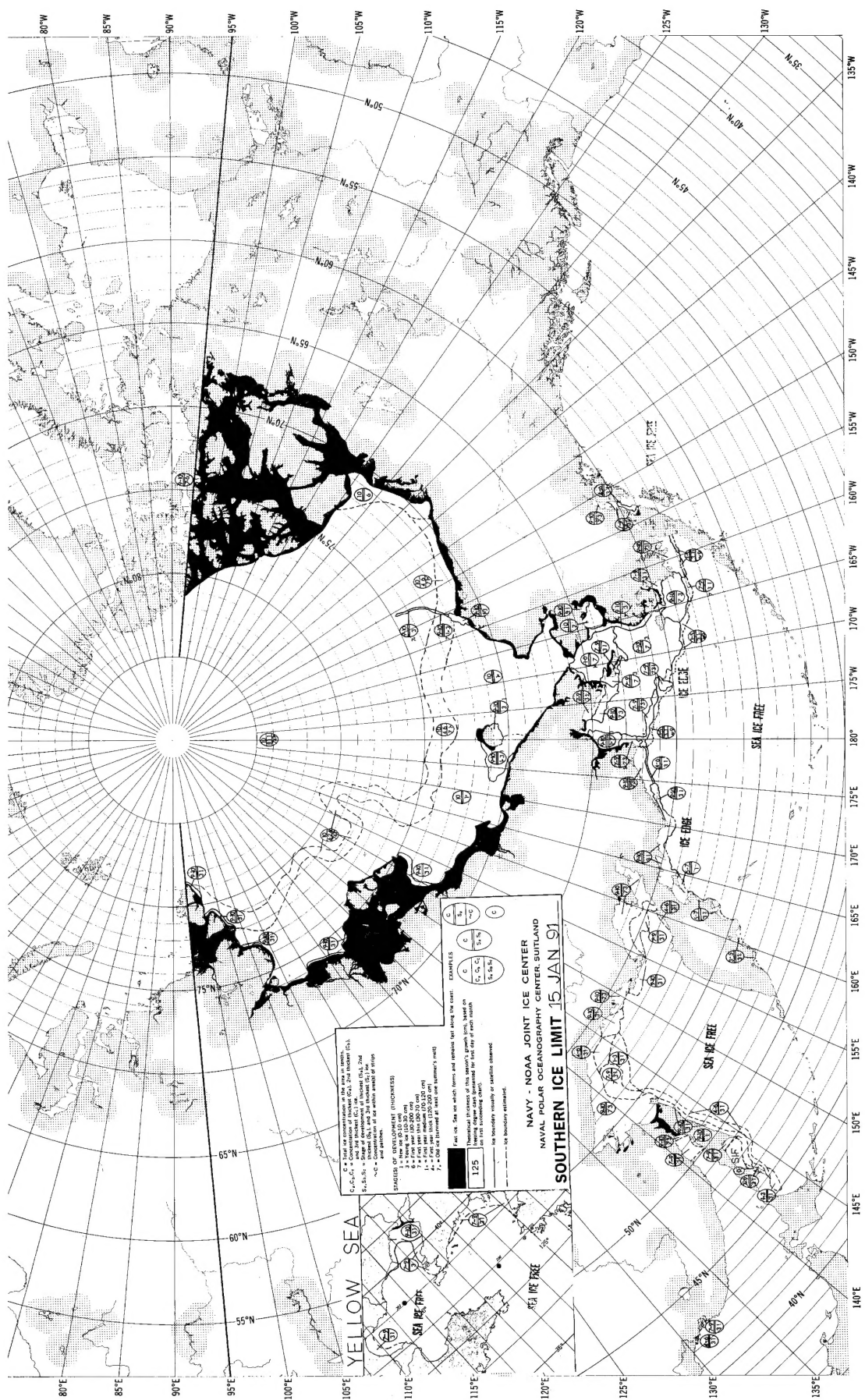
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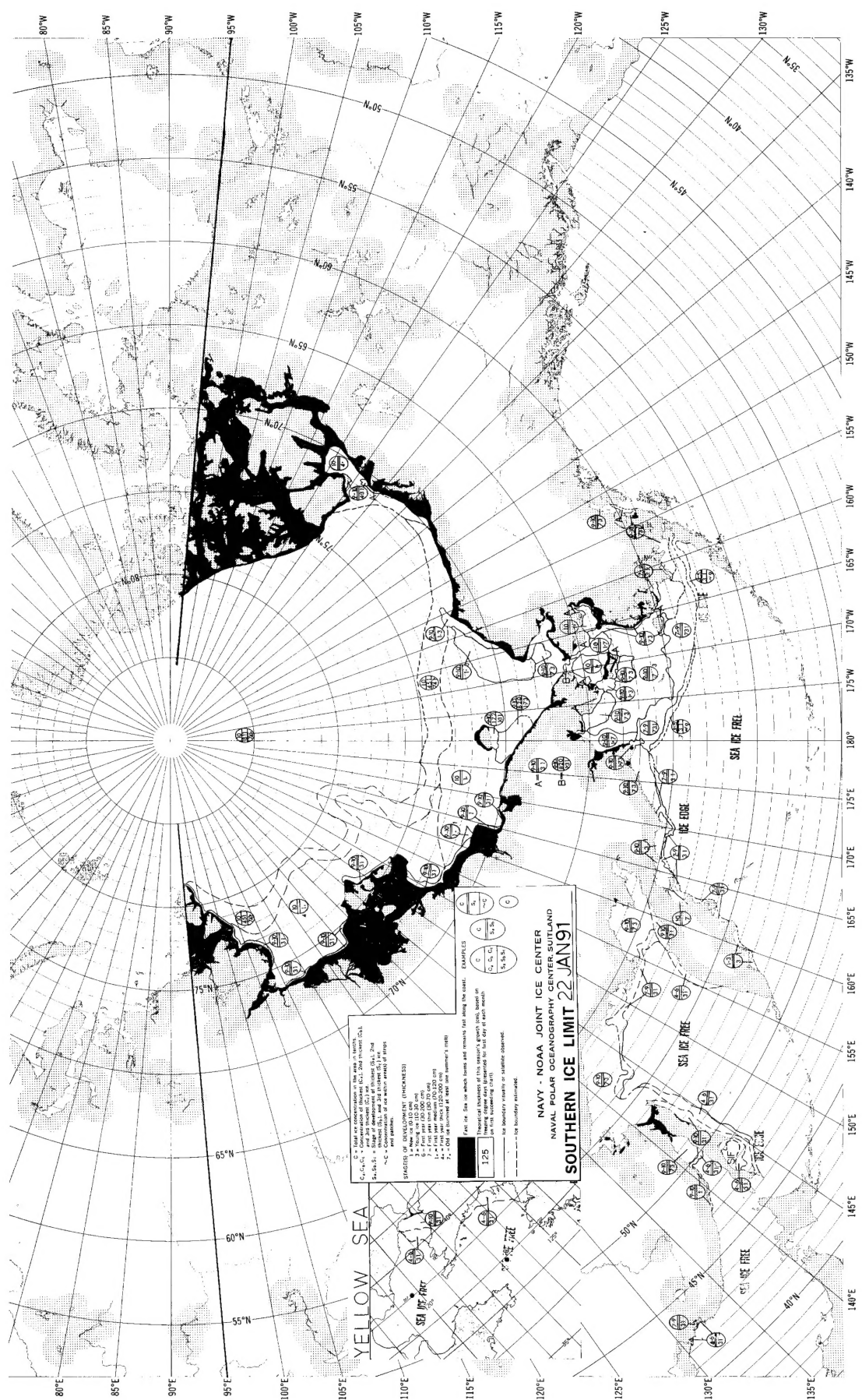


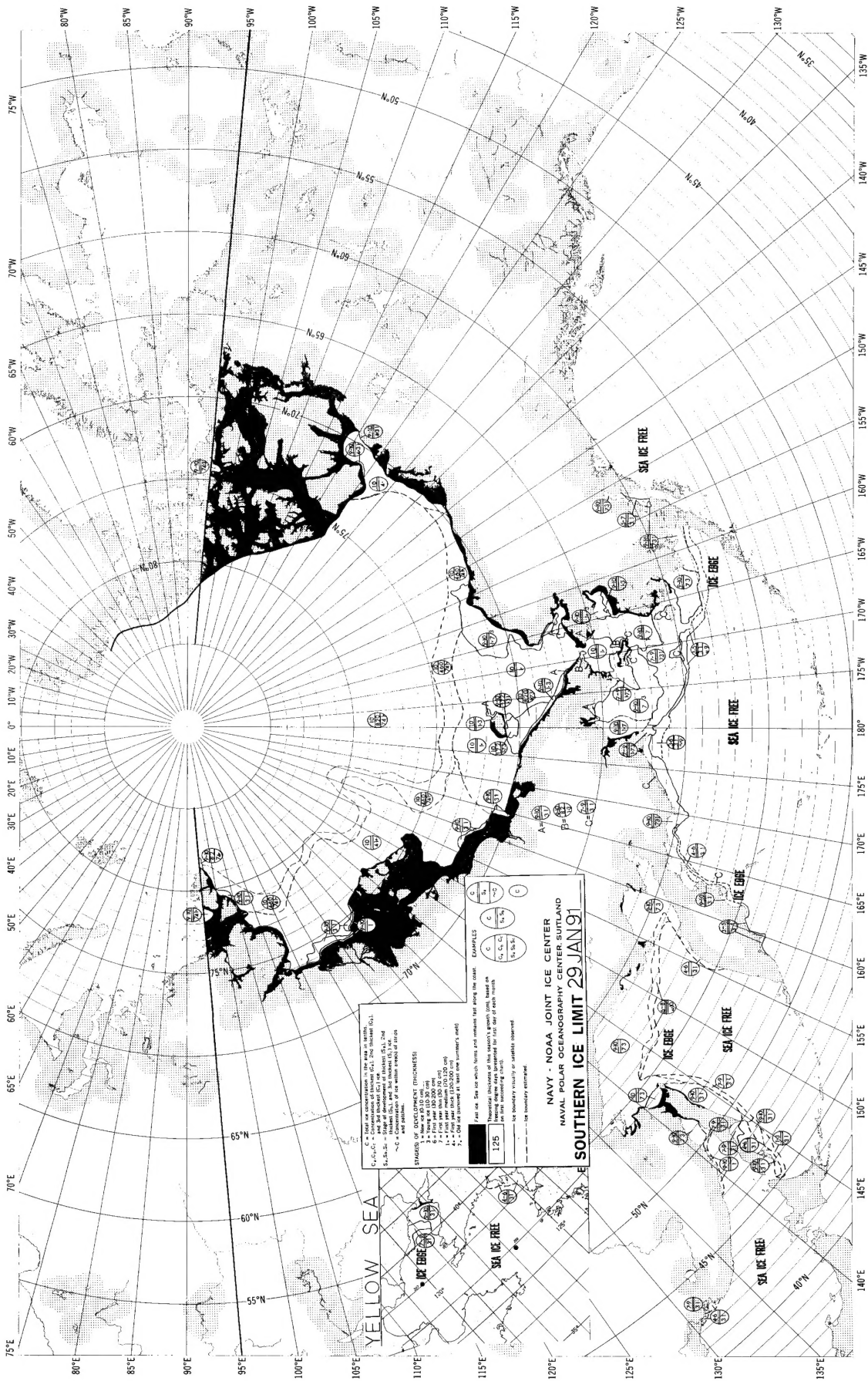
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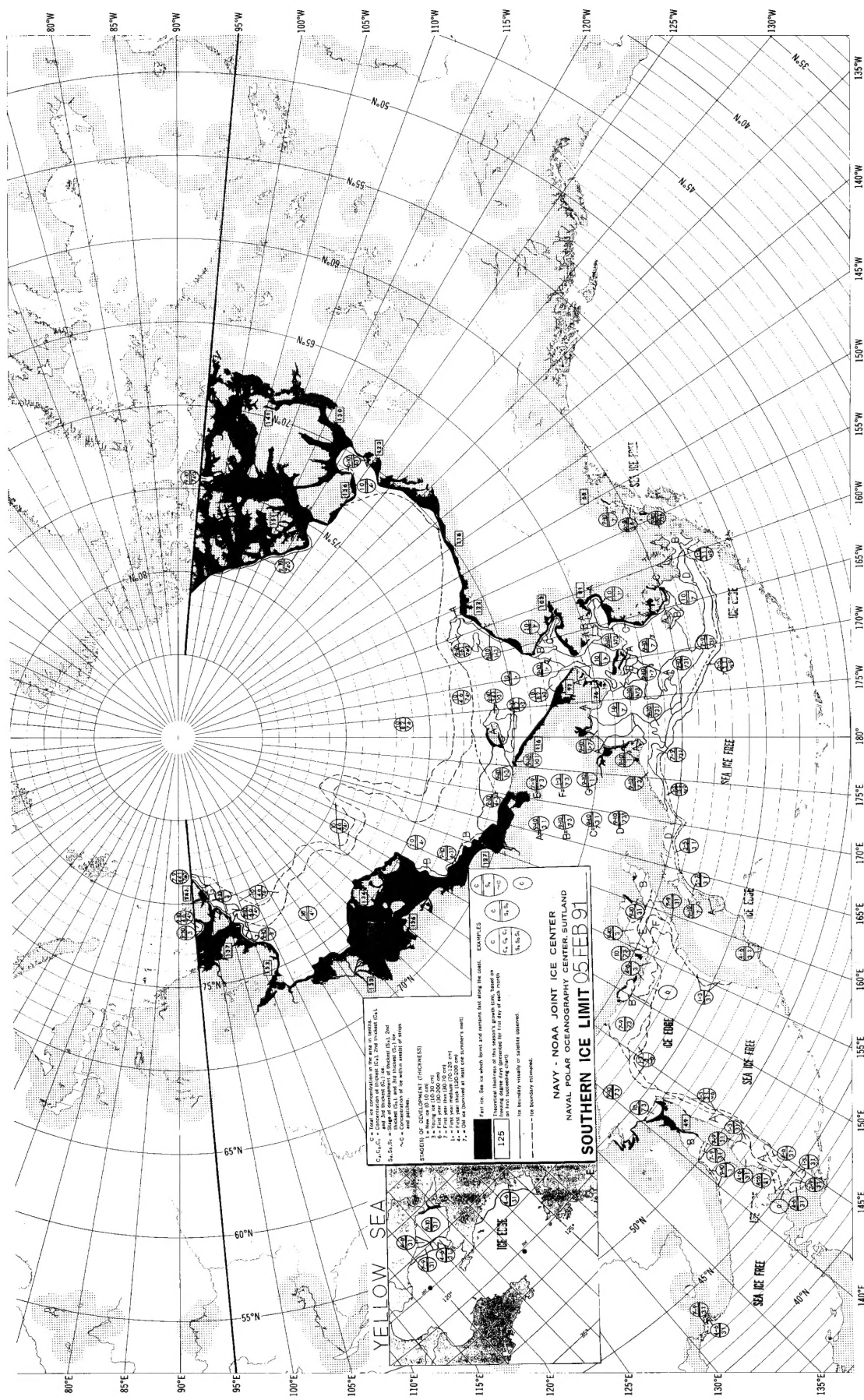
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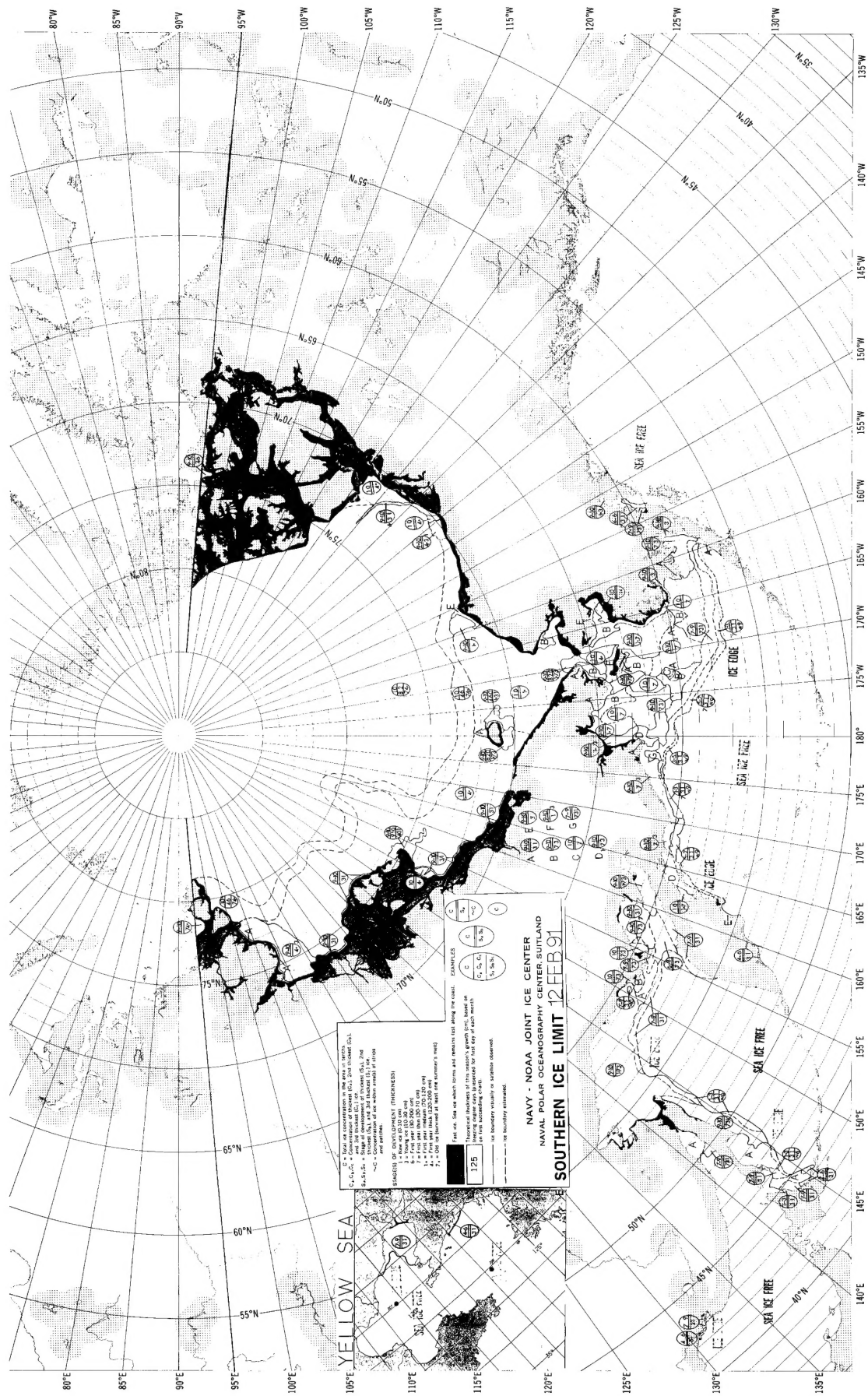


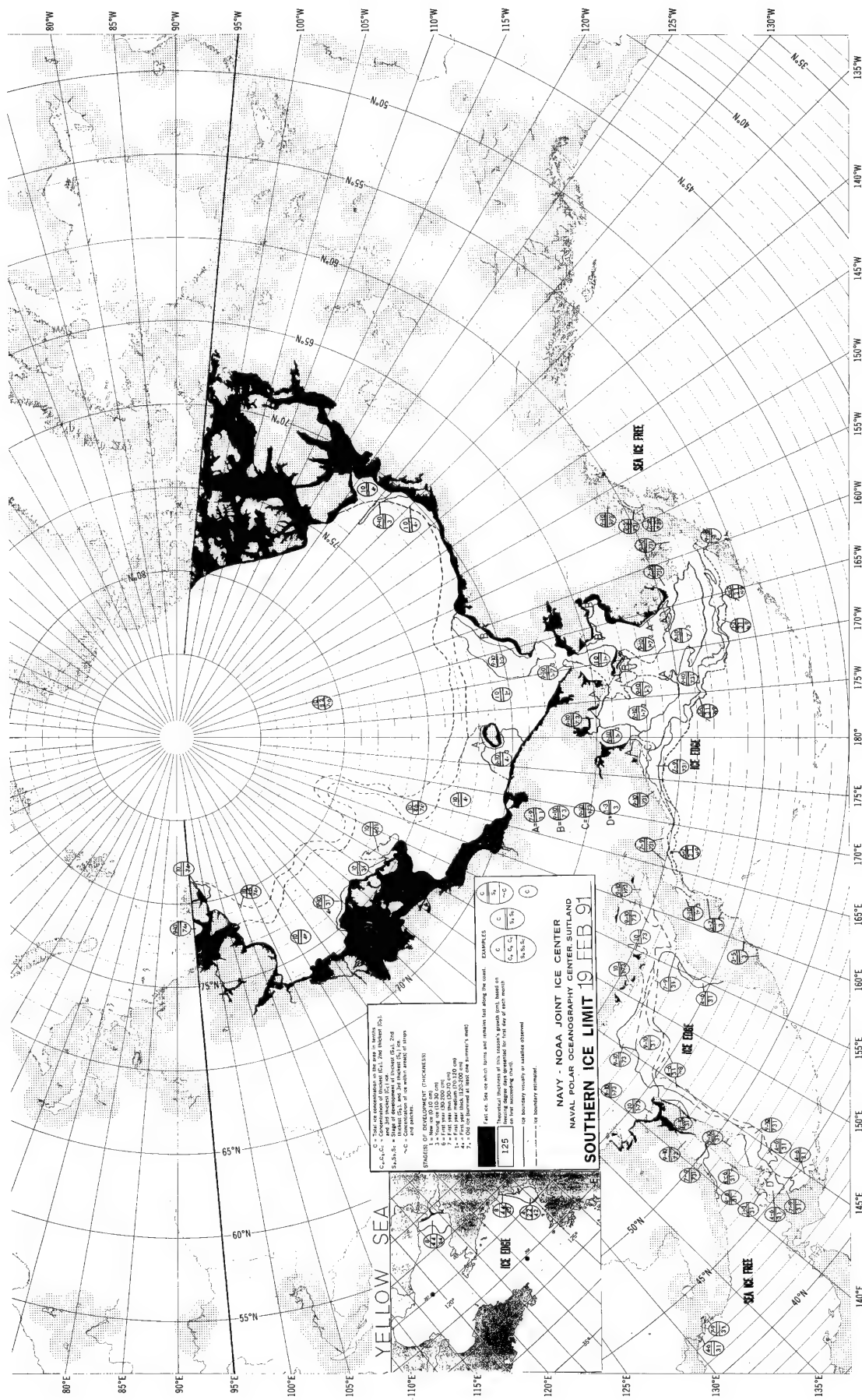


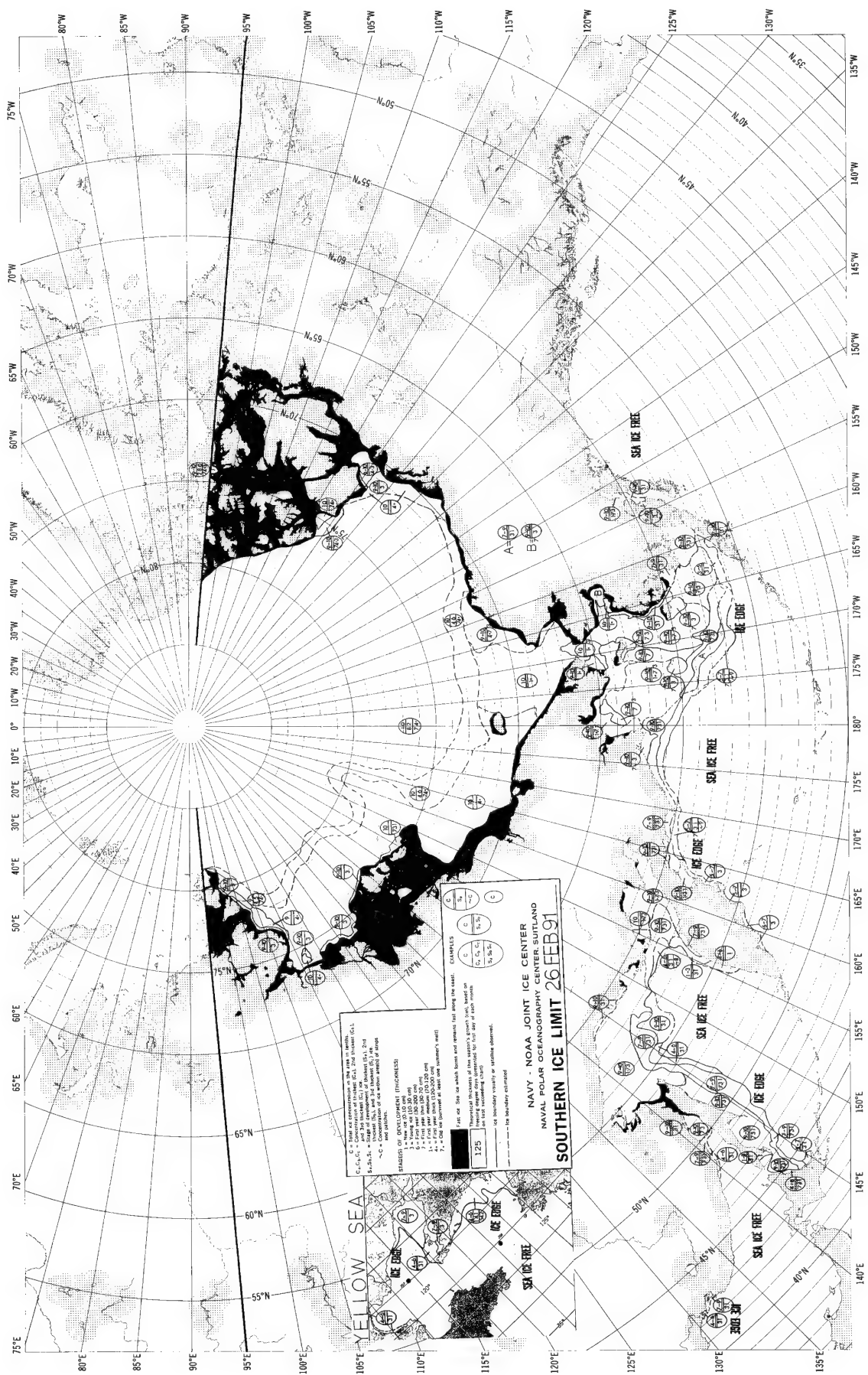


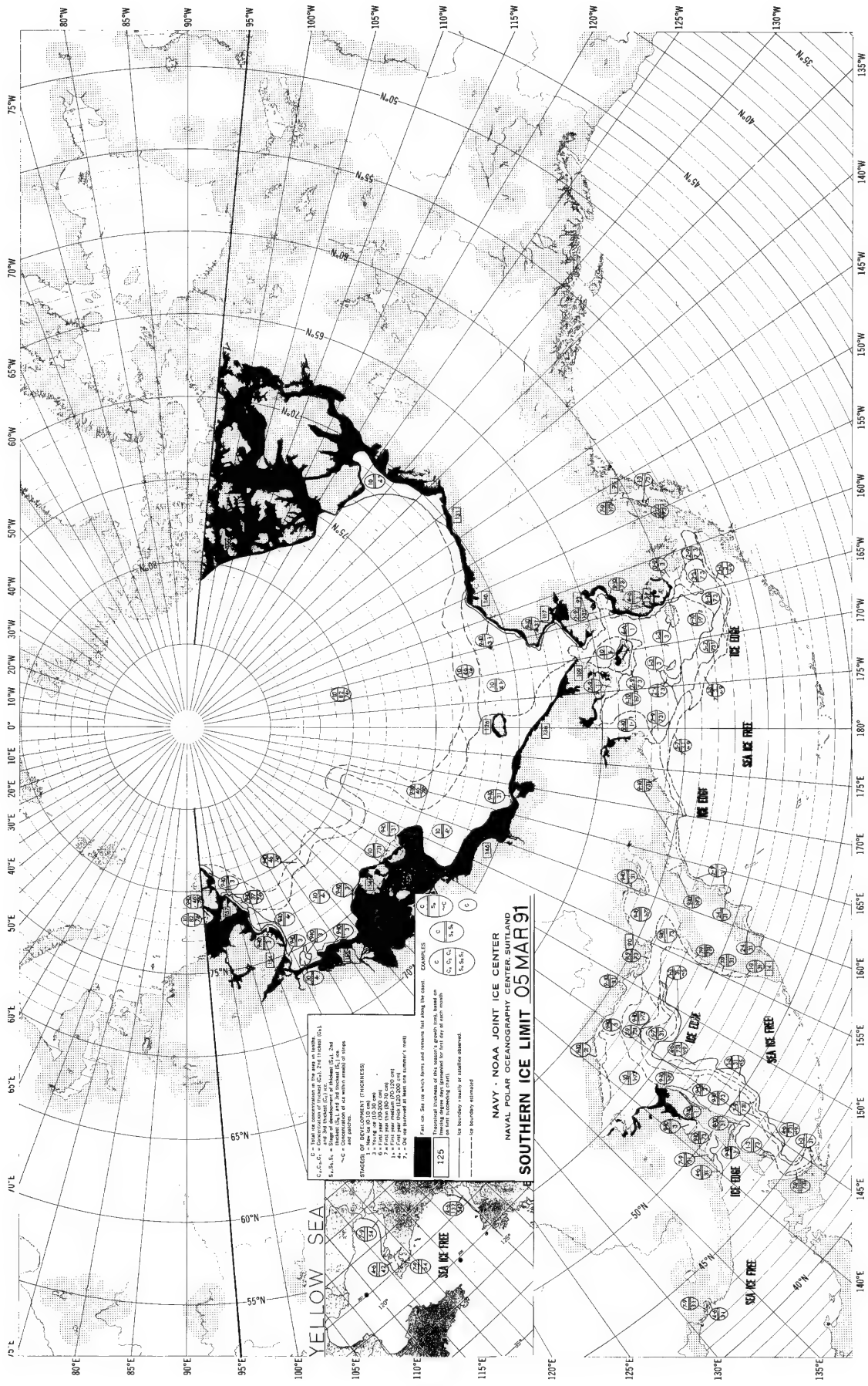












LEGEND

SYMBOLS:

- 1 - New ice (0-10 cm)
- 2 - First year ice (10-30 cm)
- 3 - First year ice (30-50 cm)
- 4 - First year ice (50-100 cm)
- 5 - First year ice (100-150 cm)
- 6 - First year ice (150-200 cm)
- 7 - Old ice (200+ cm)

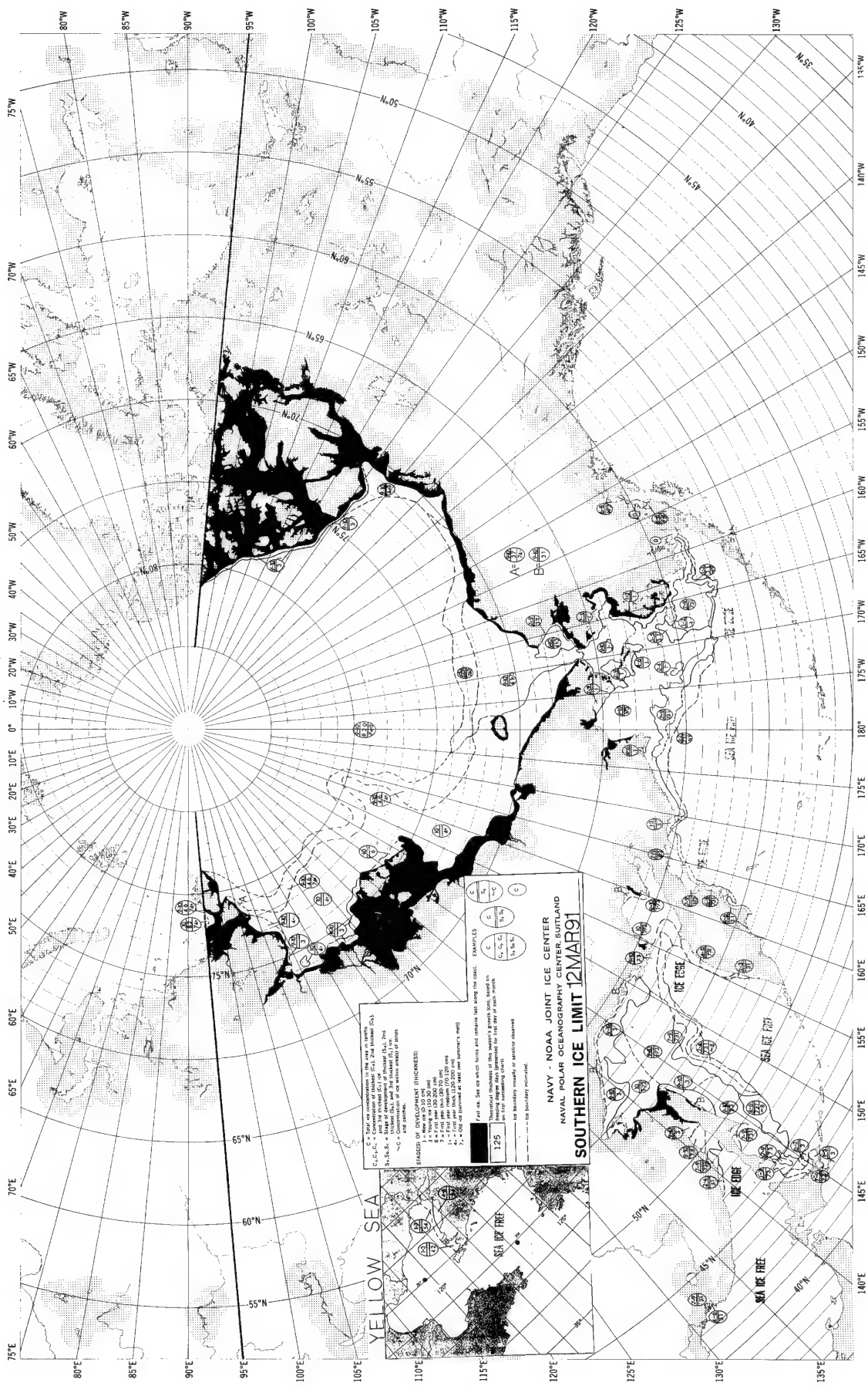
STAGES OF ICE DEVELOPMENT (THICKNESS):

- 1 - New ice (0-10 cm)
- 2 - First year ice (10-30 cm)
- 3 - First year ice (30-50 cm)
- 4 - First year ice (50-100 cm)
- 5 - First year ice (100-150 cm)
- 6 - First year ice (150-200 cm)
- 7 - Old ice (200+ cm)

NOTES:

- 1. Data is derived from the area of study.
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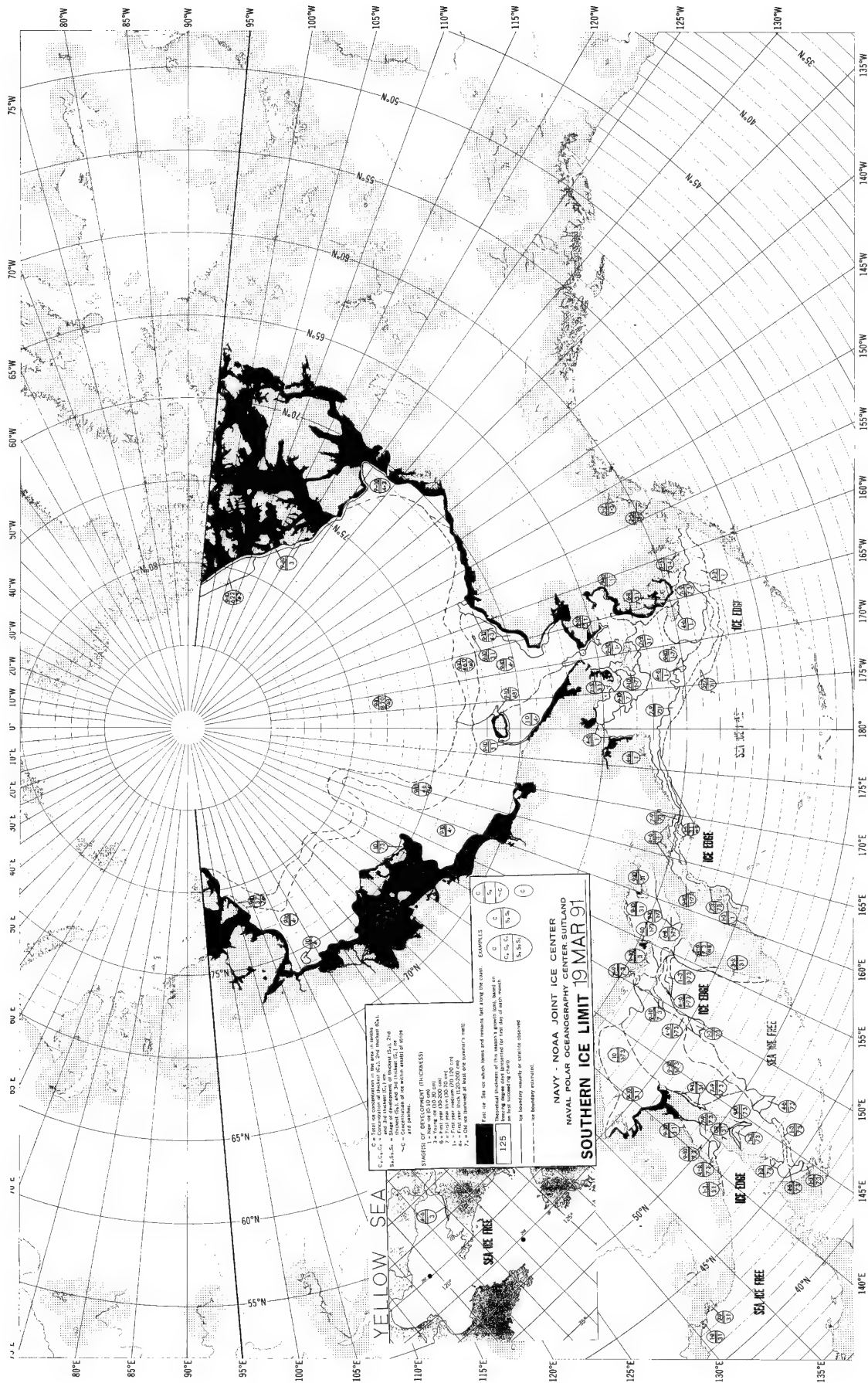
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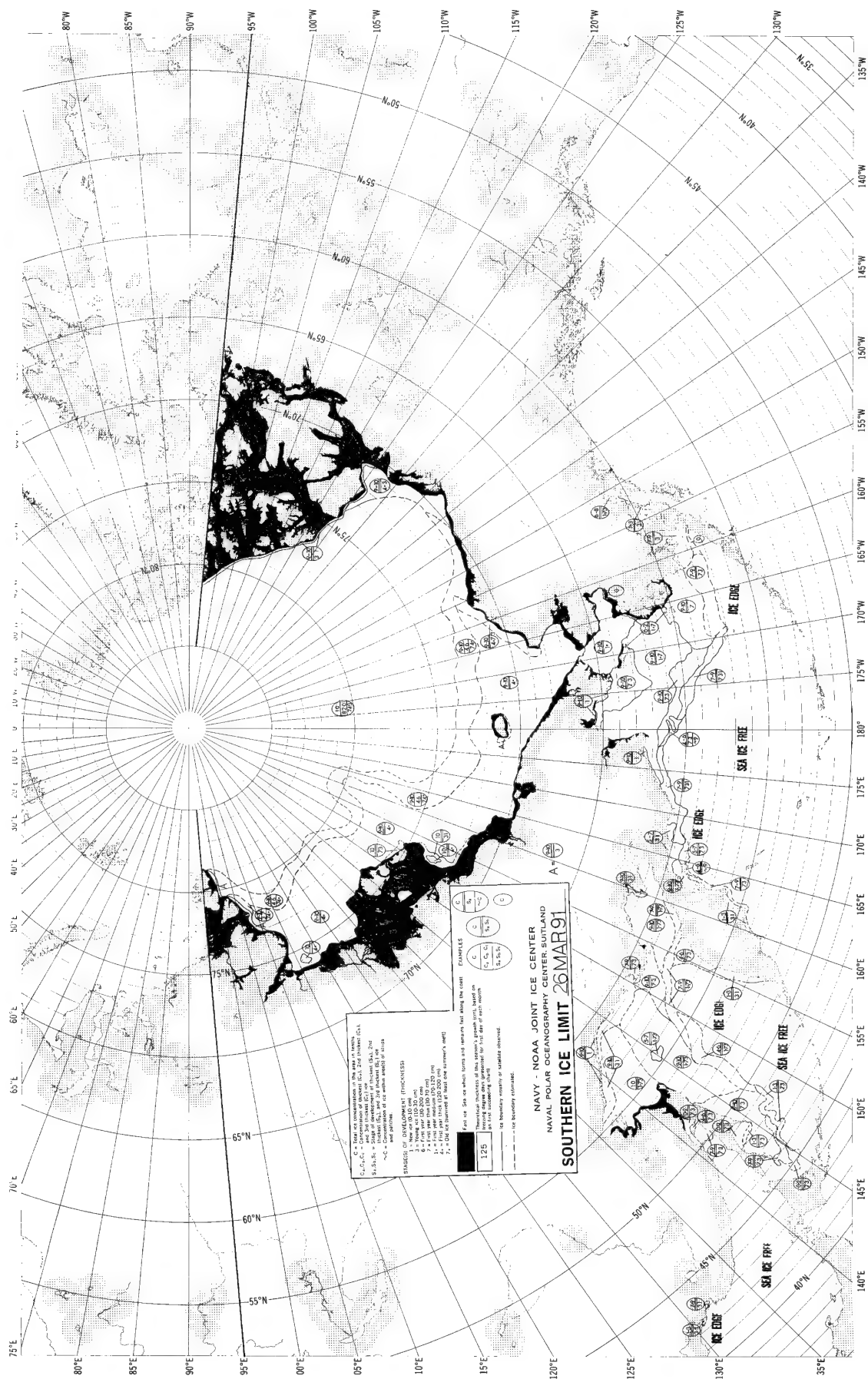
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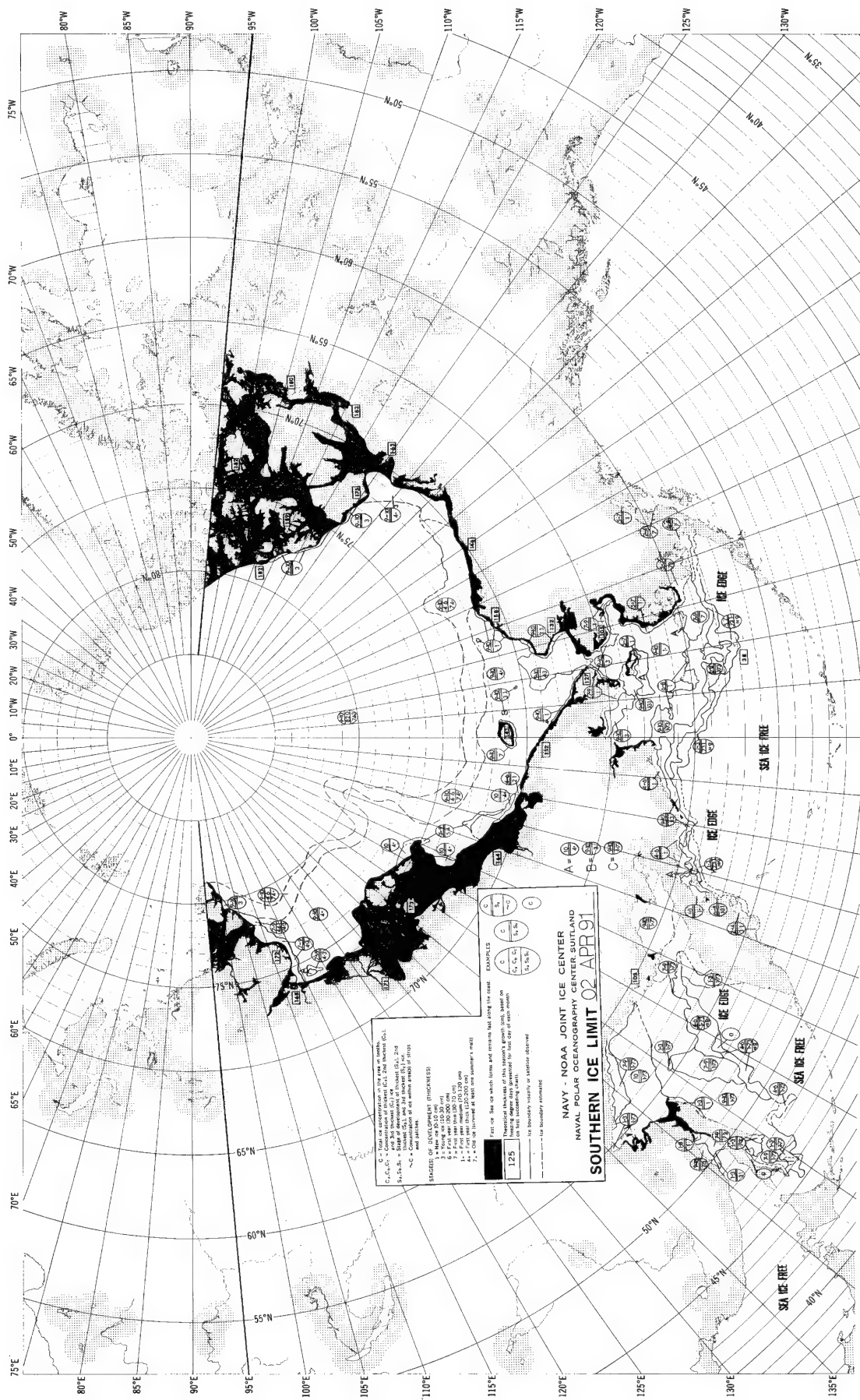
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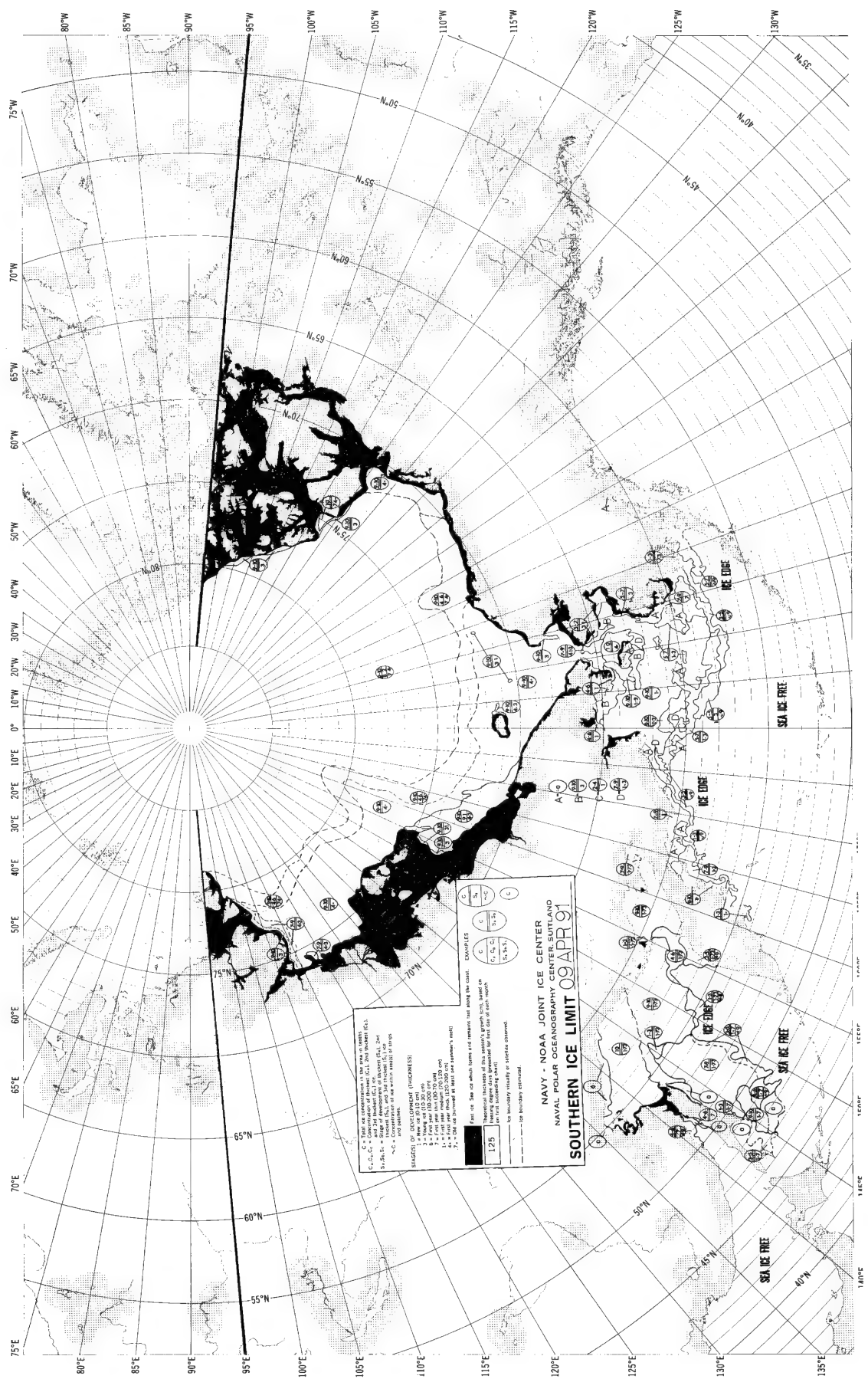
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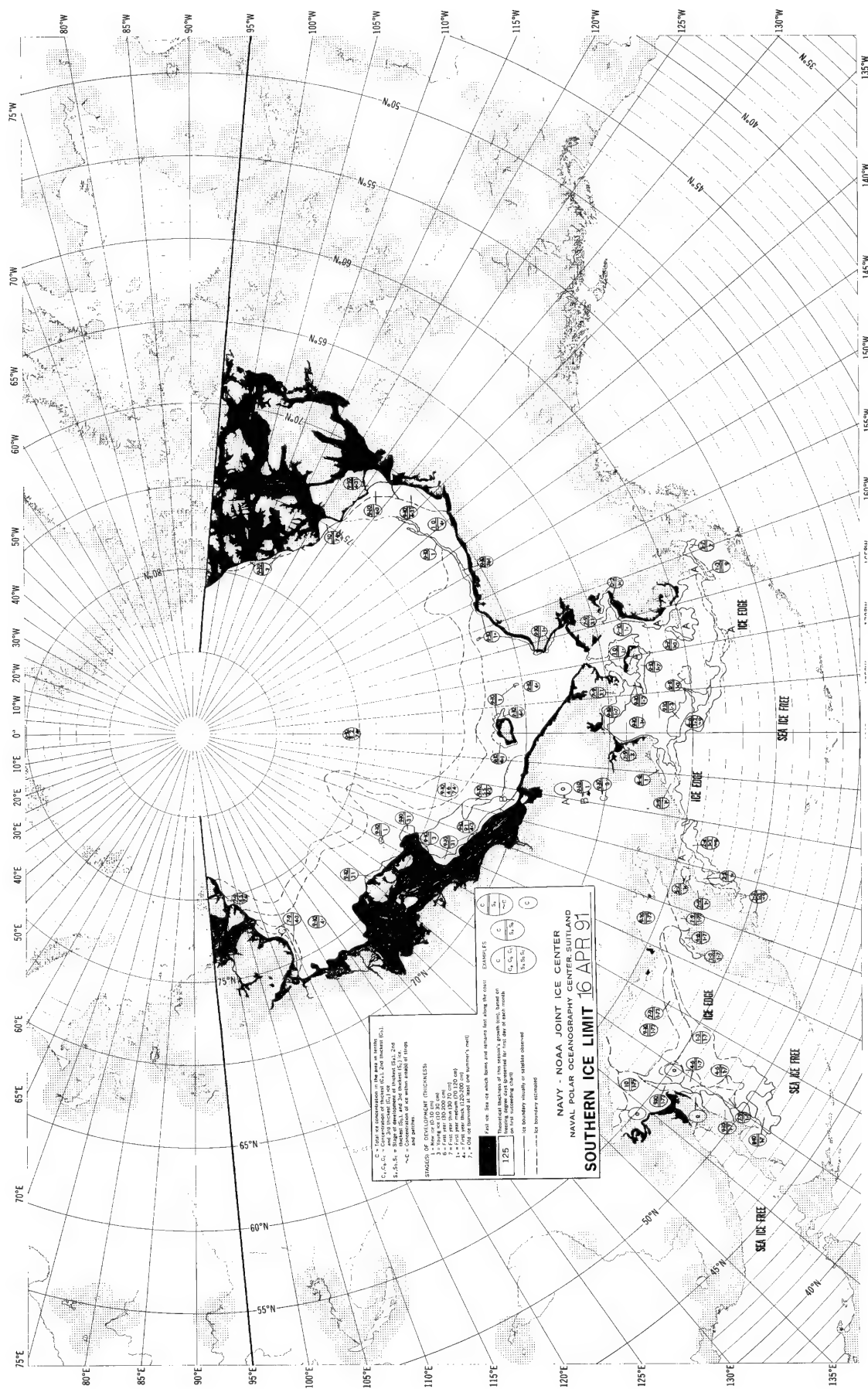
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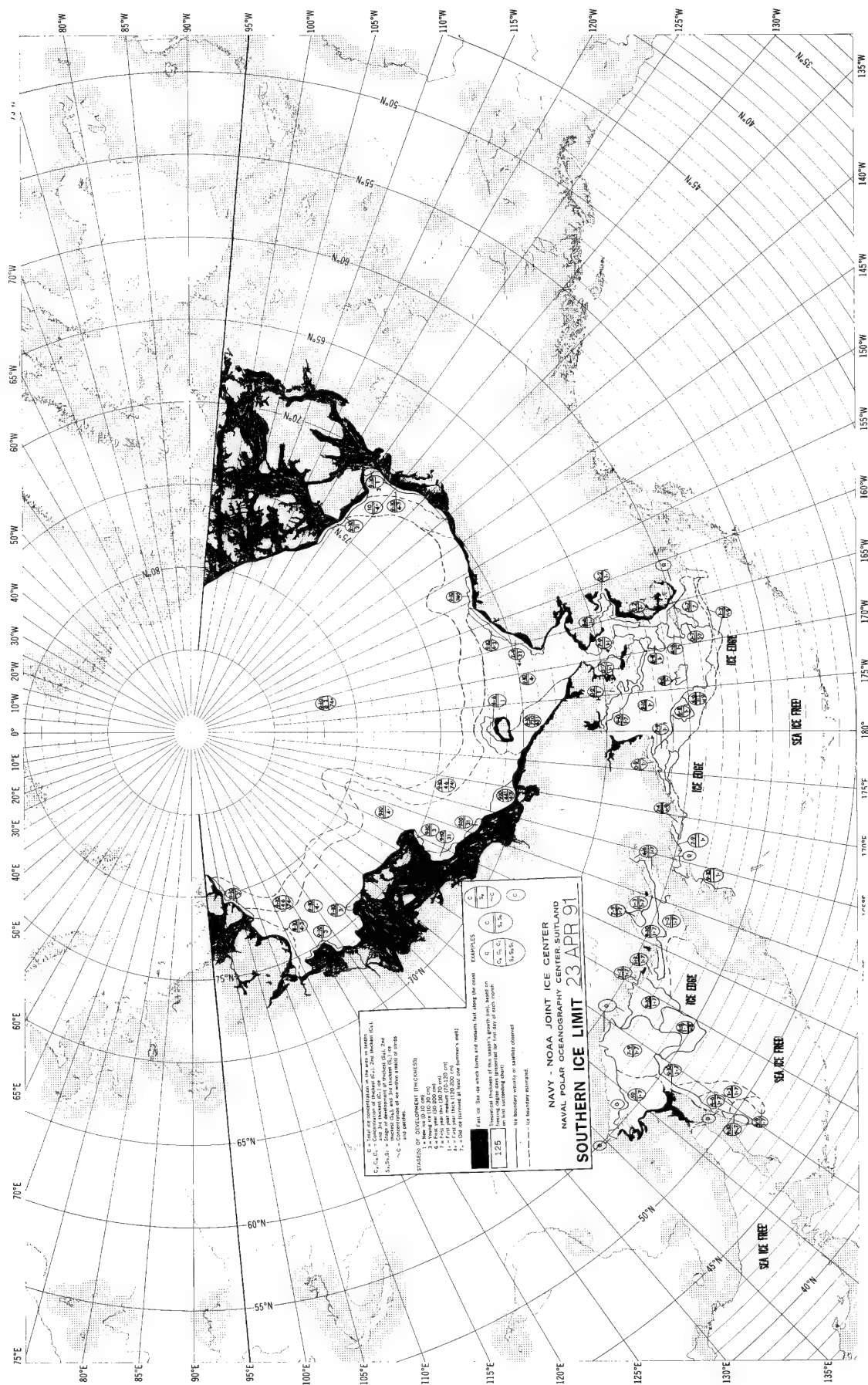


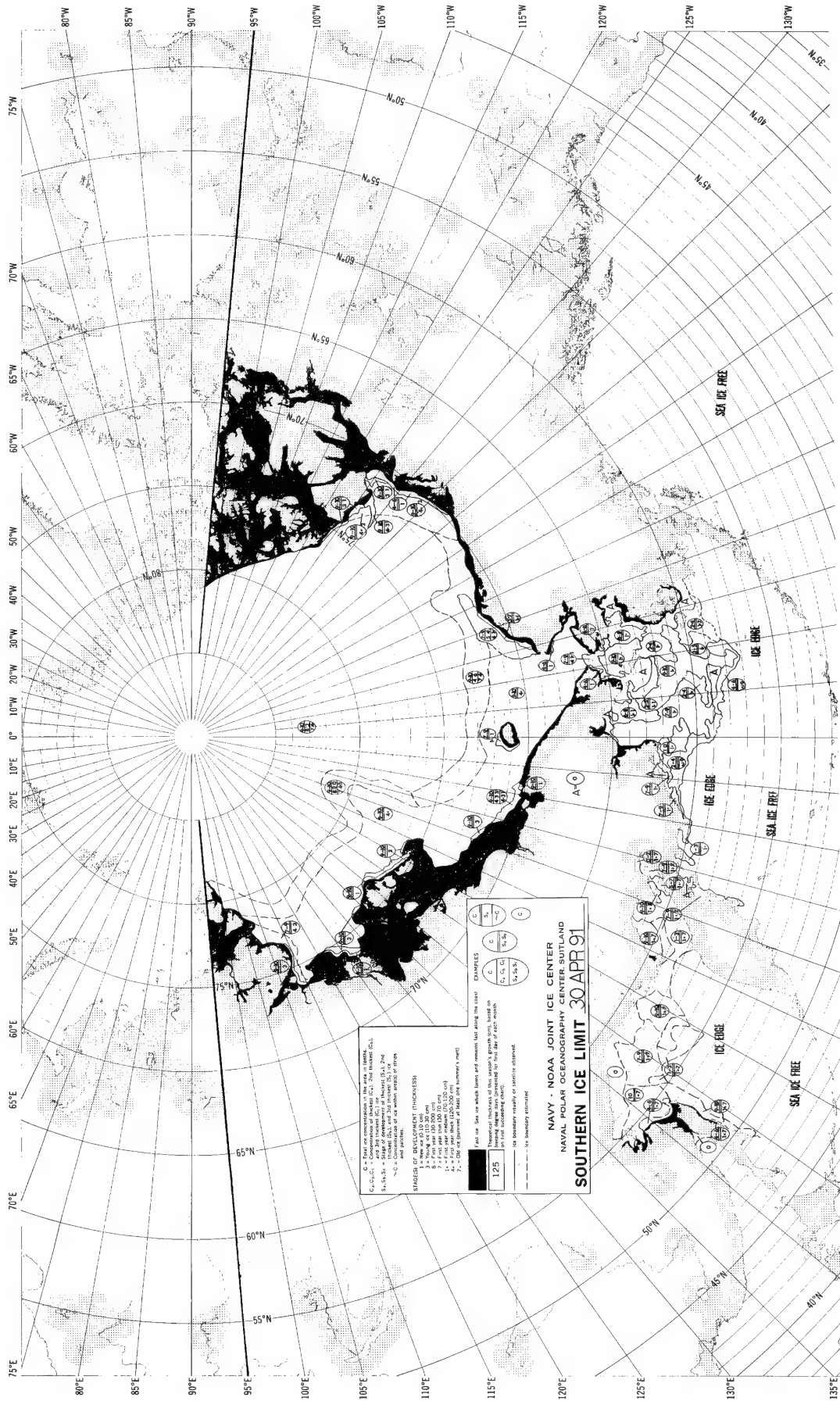


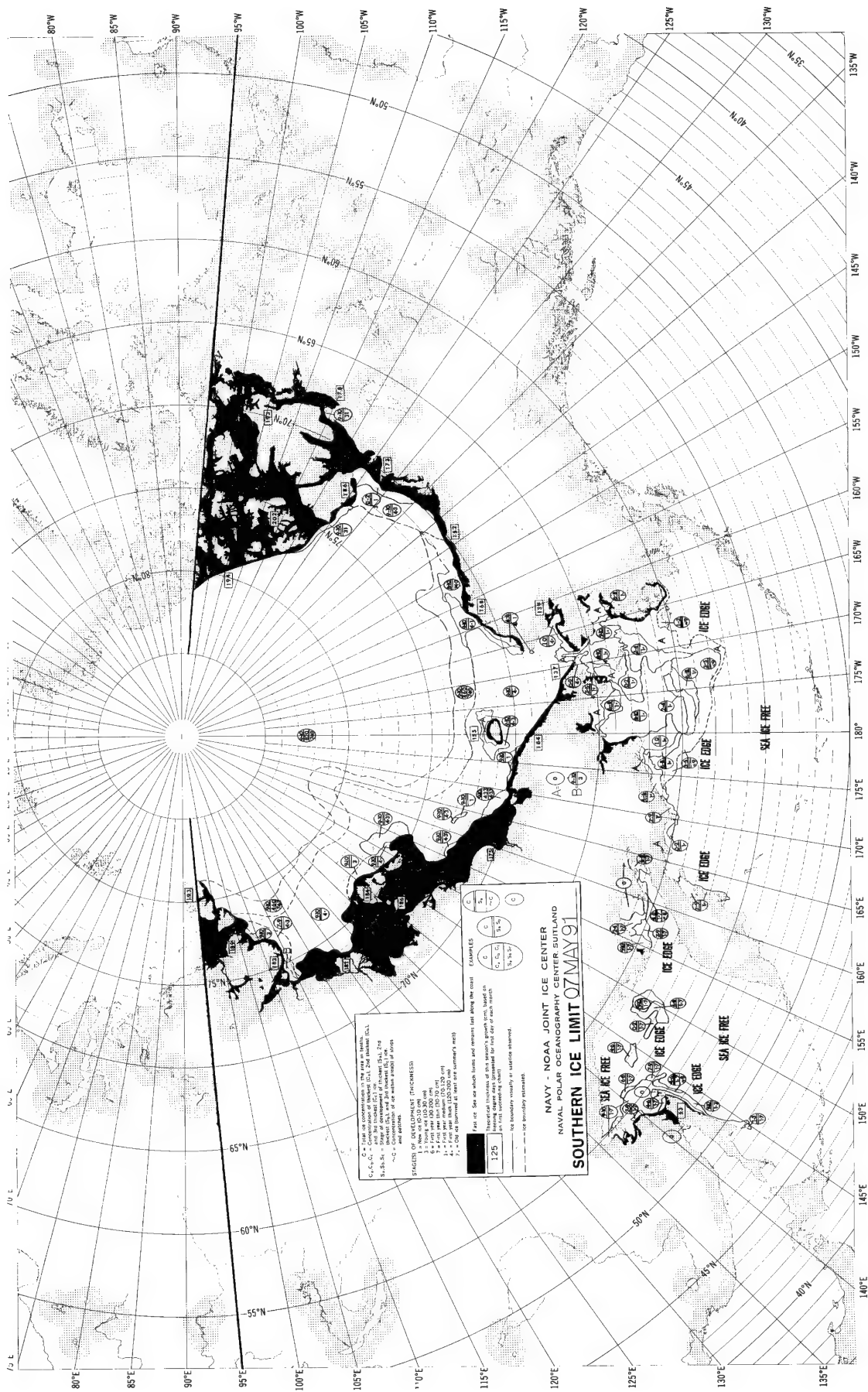


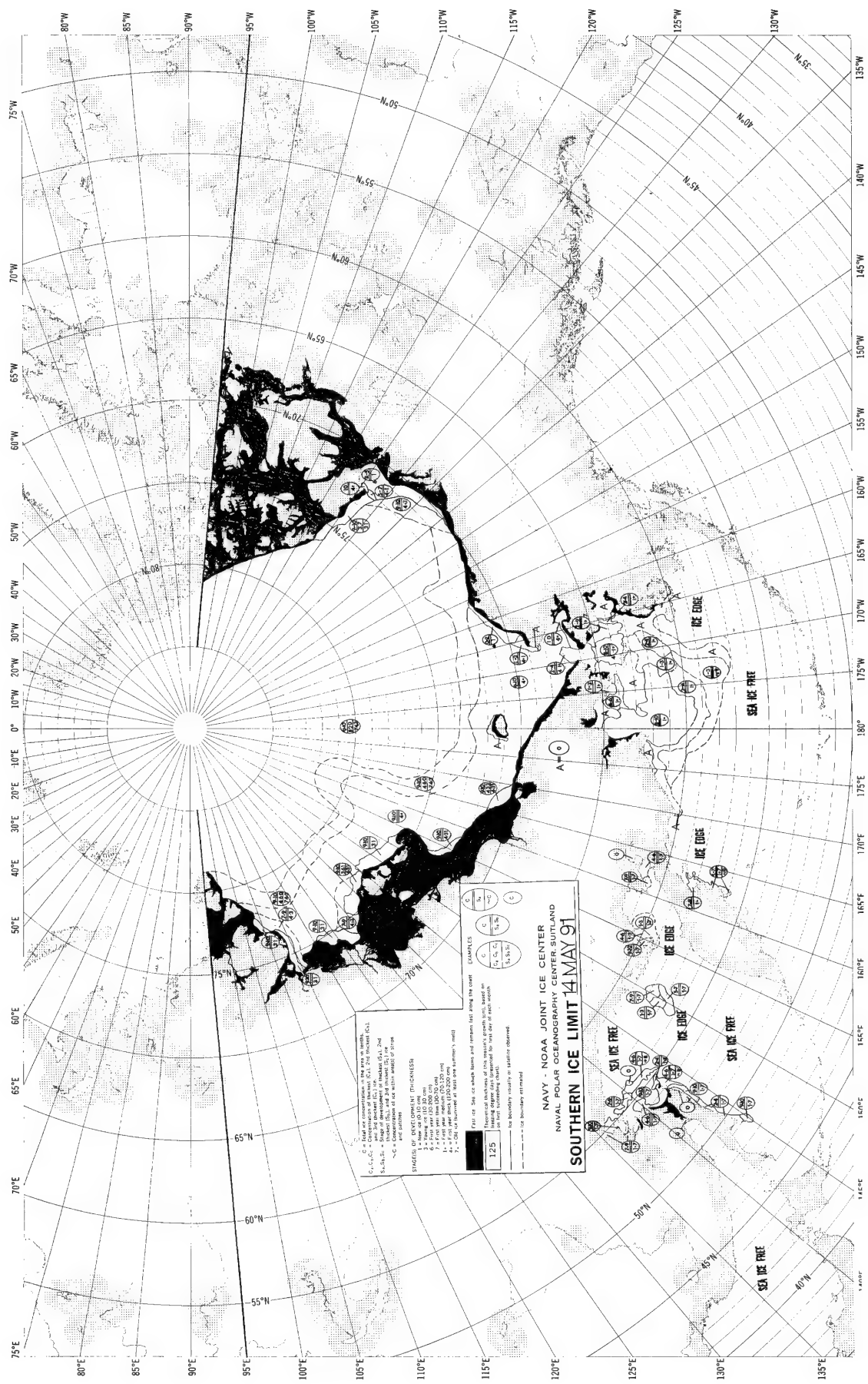


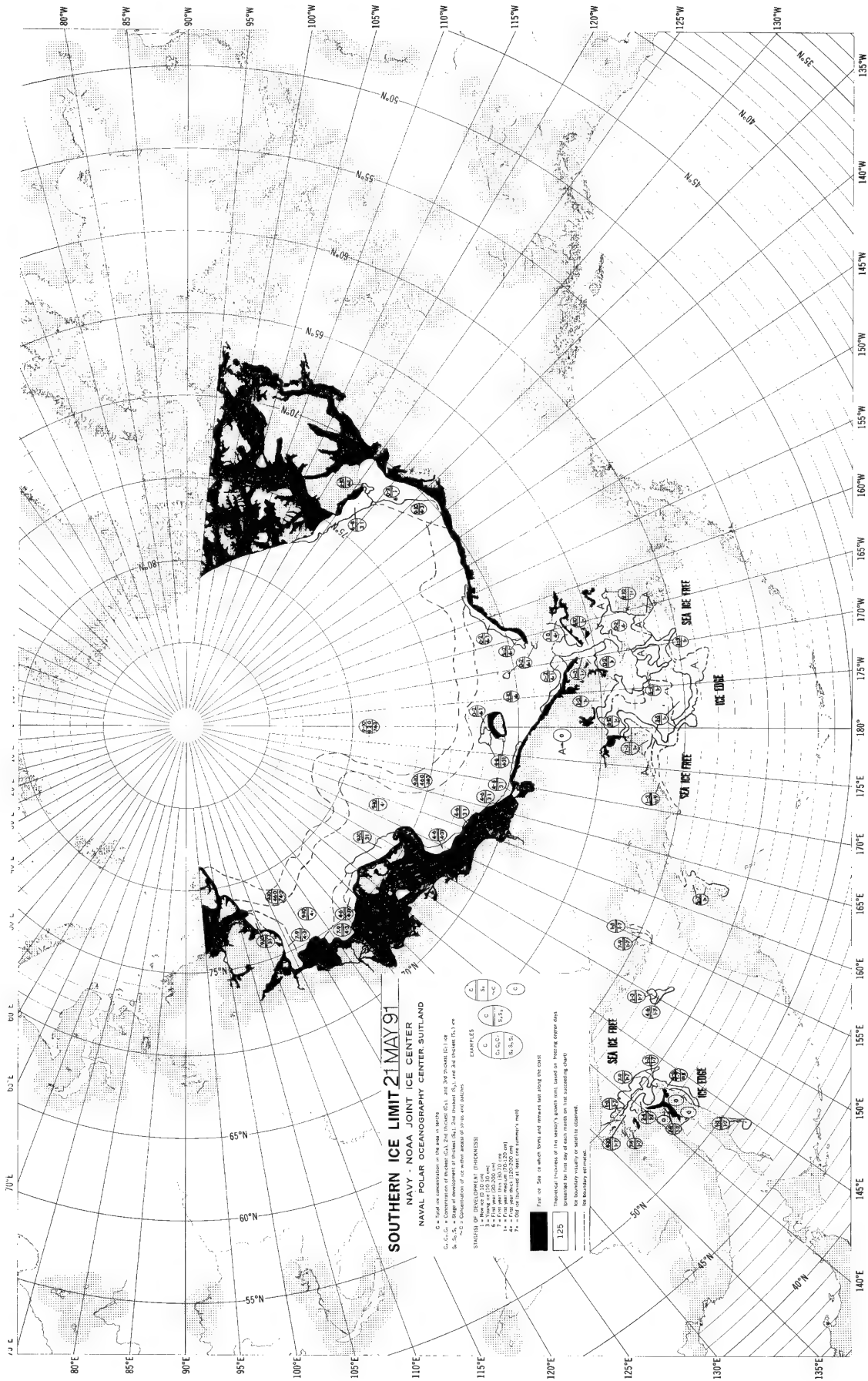


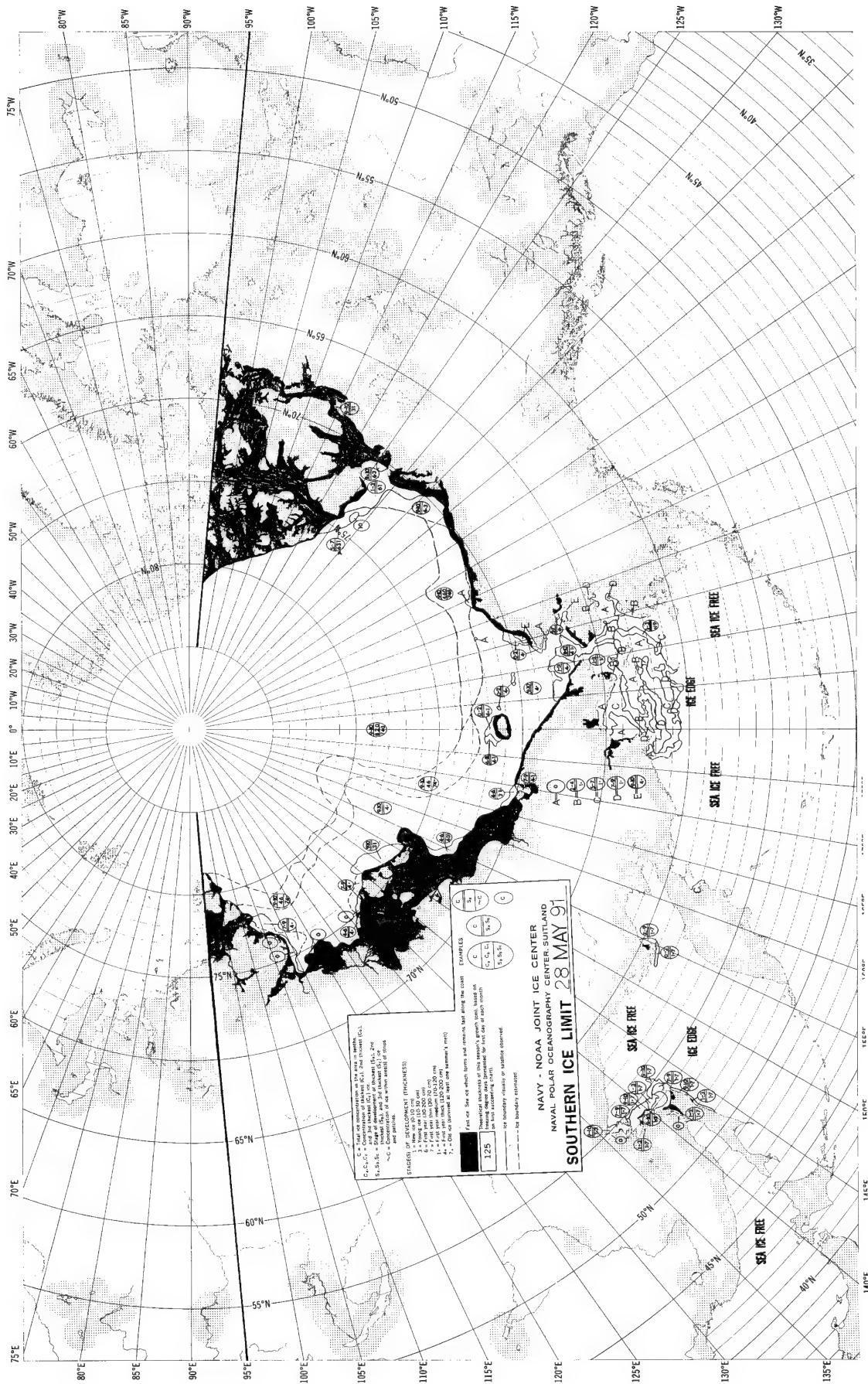


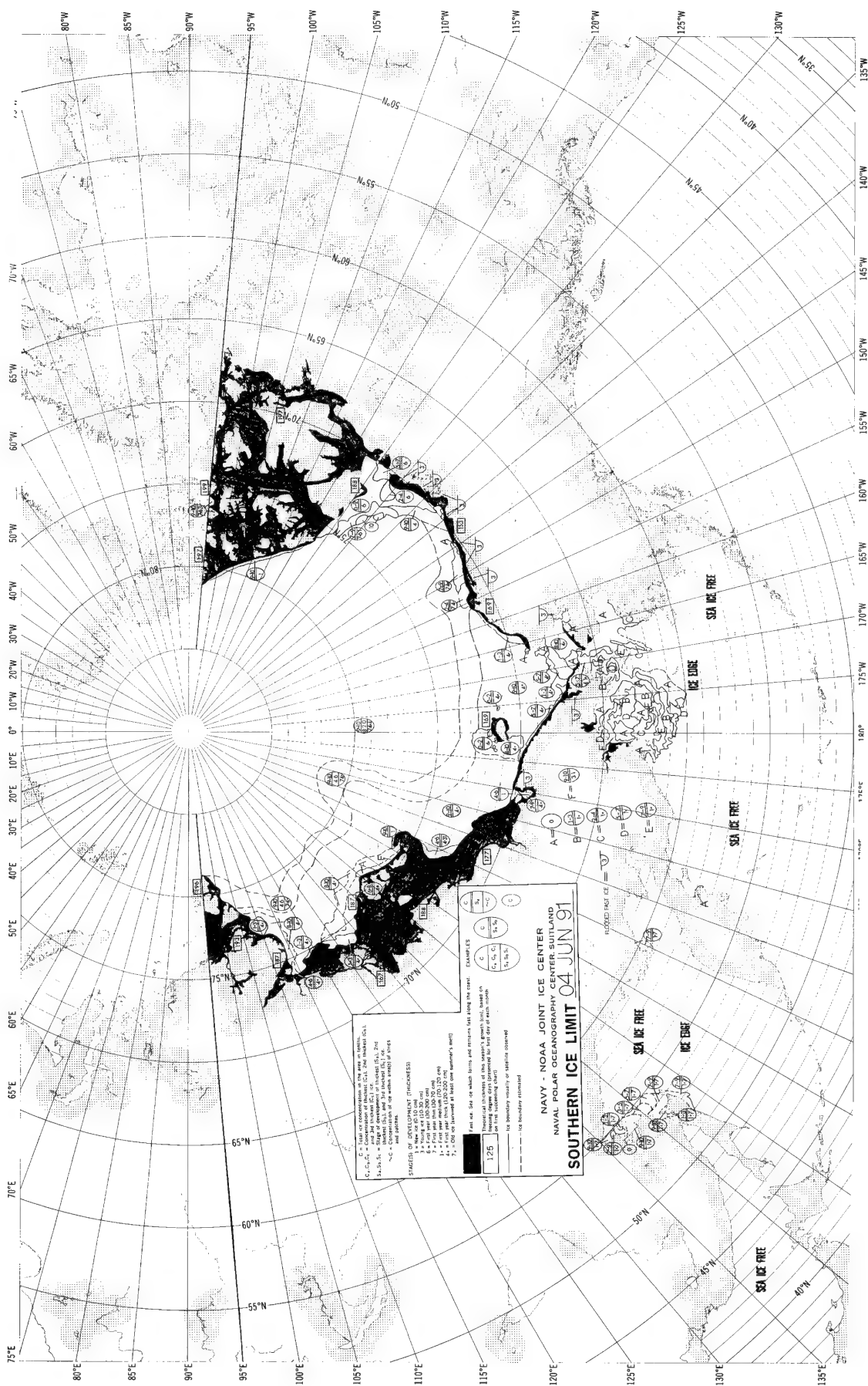


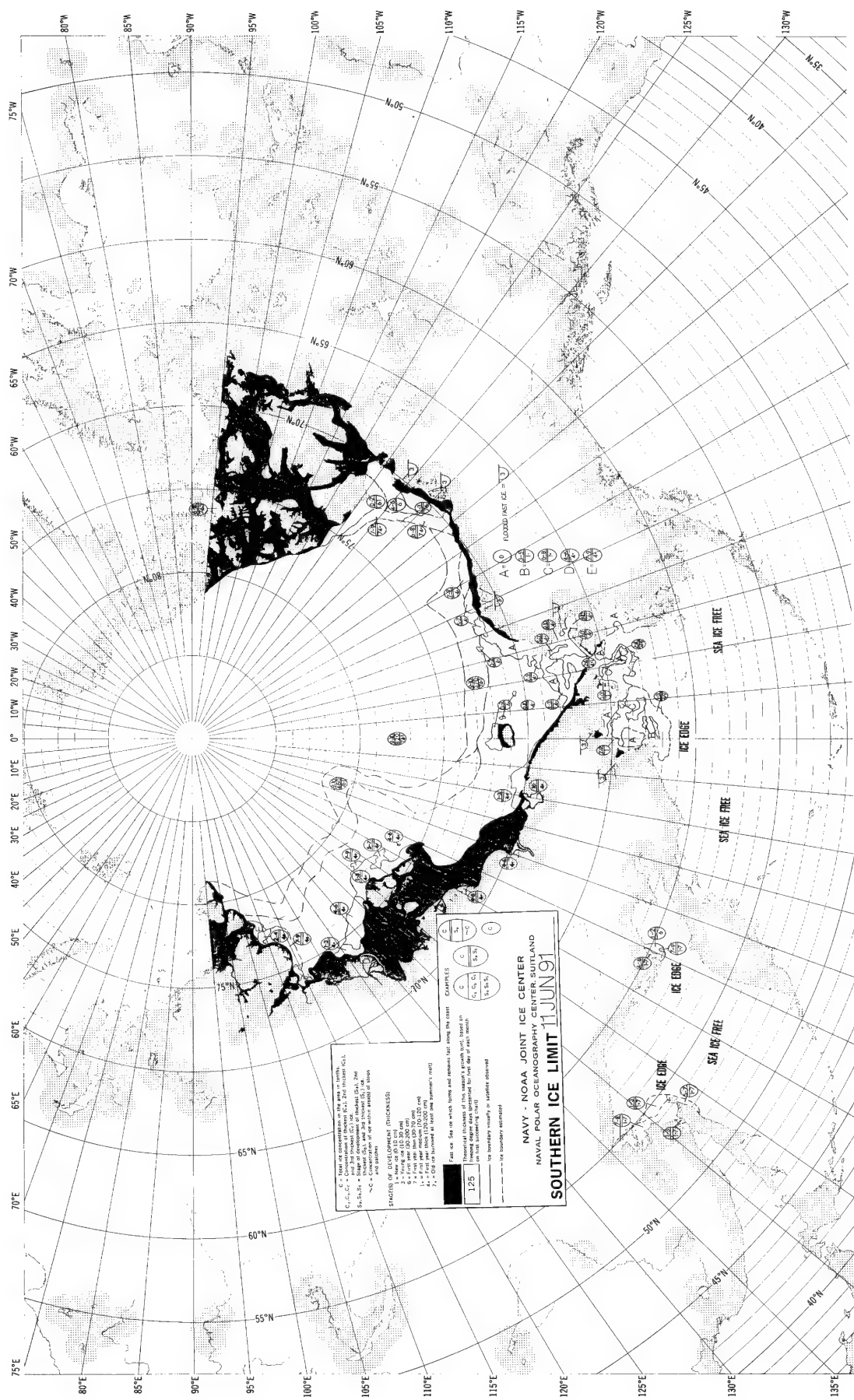


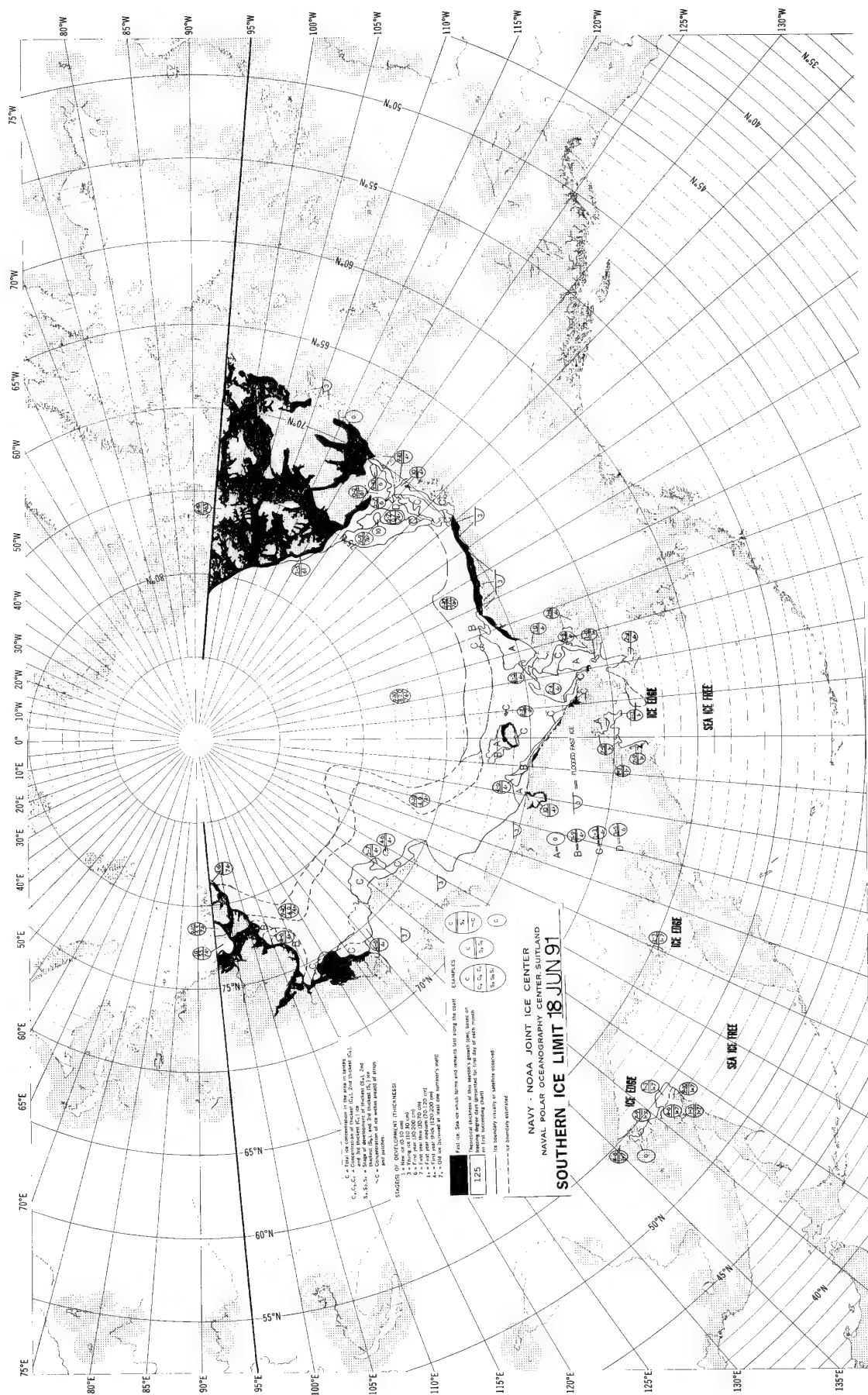


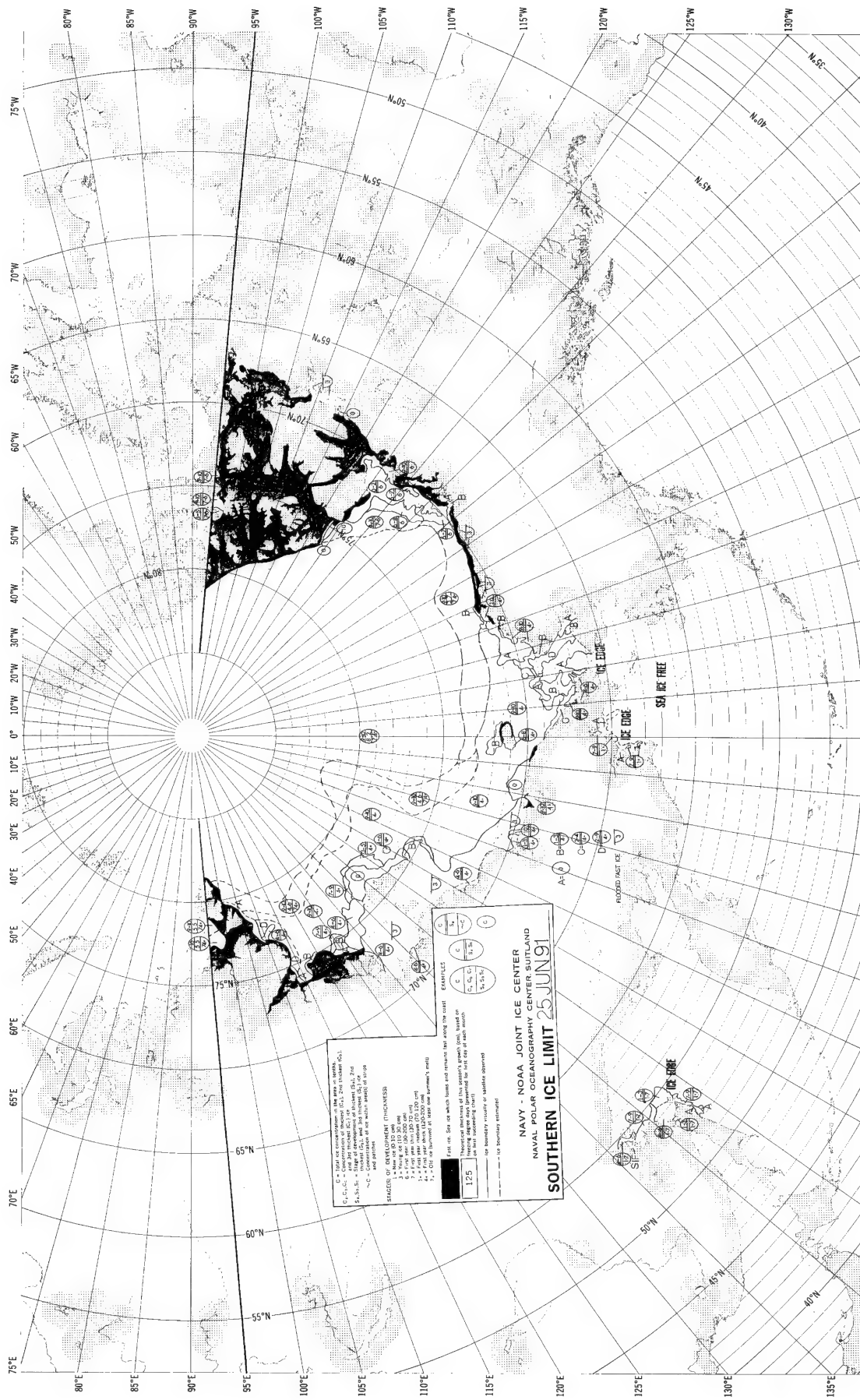


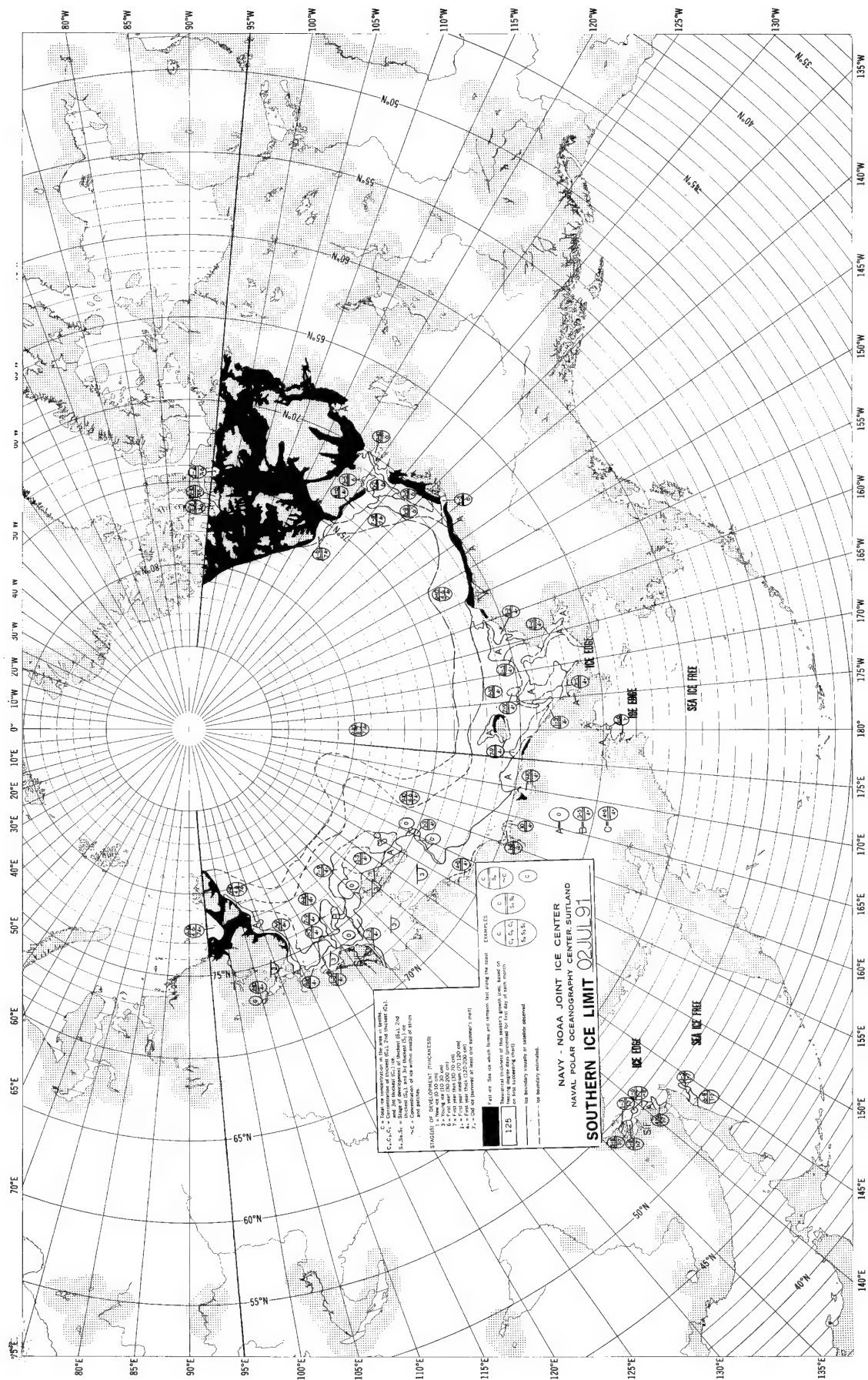


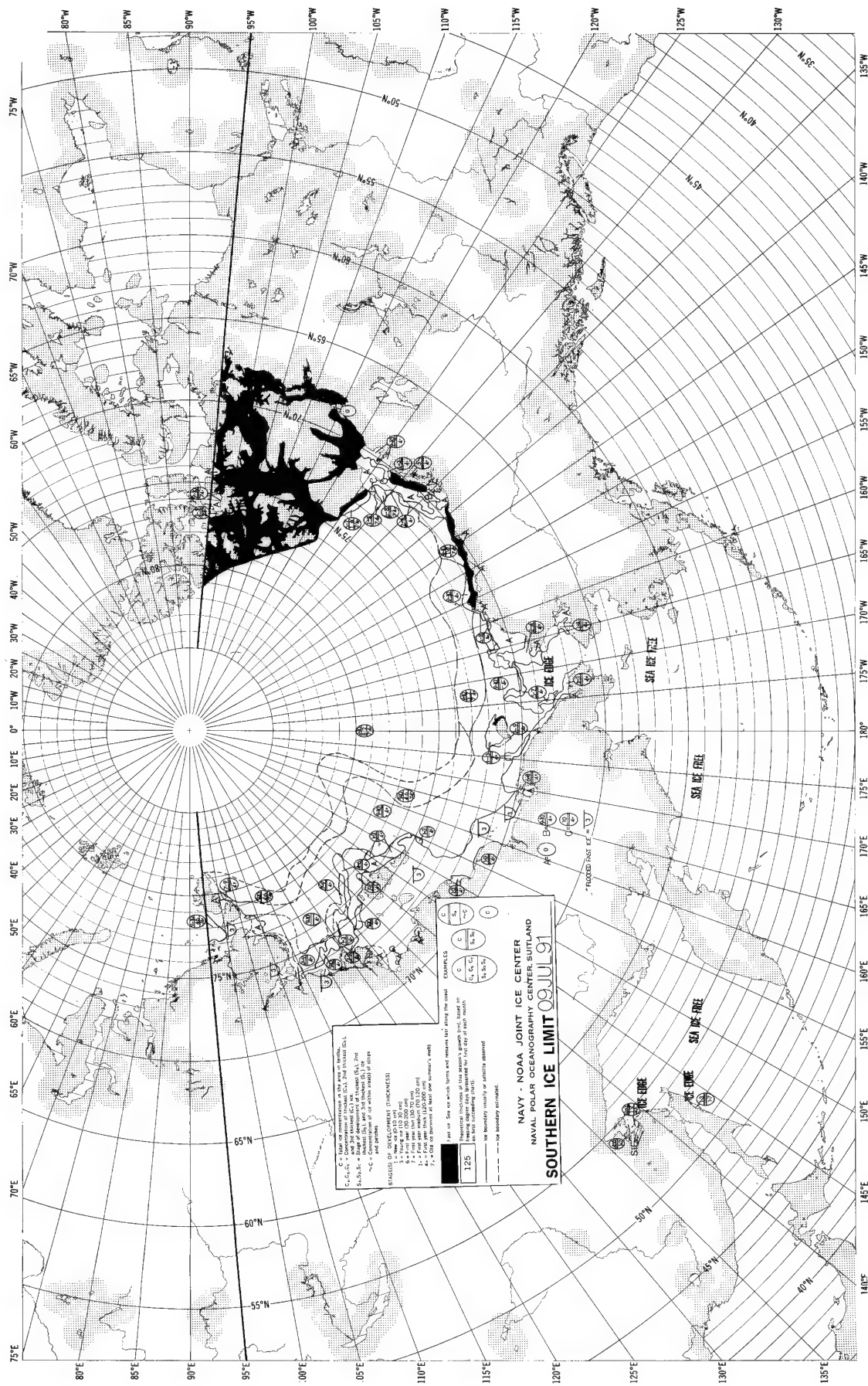


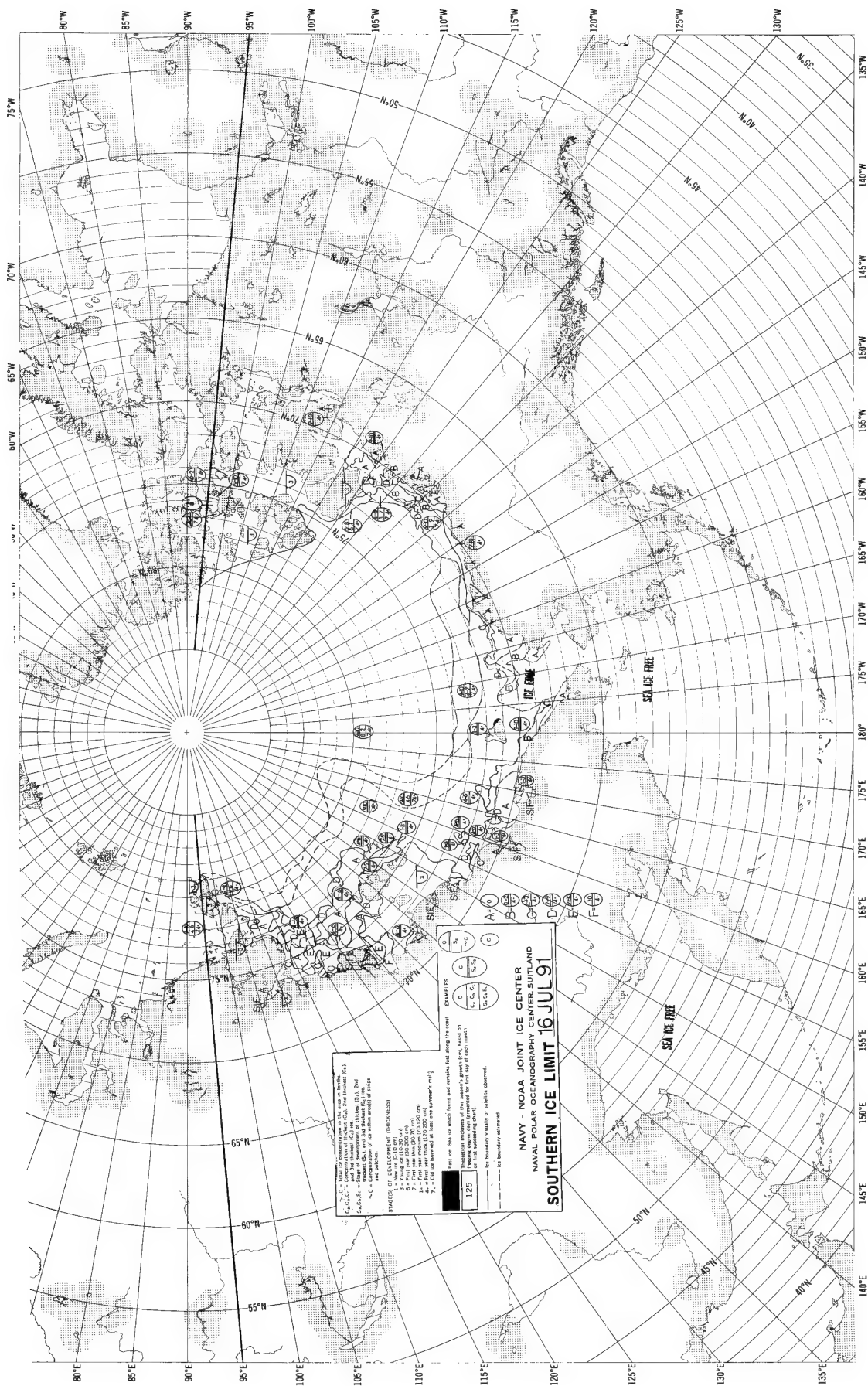


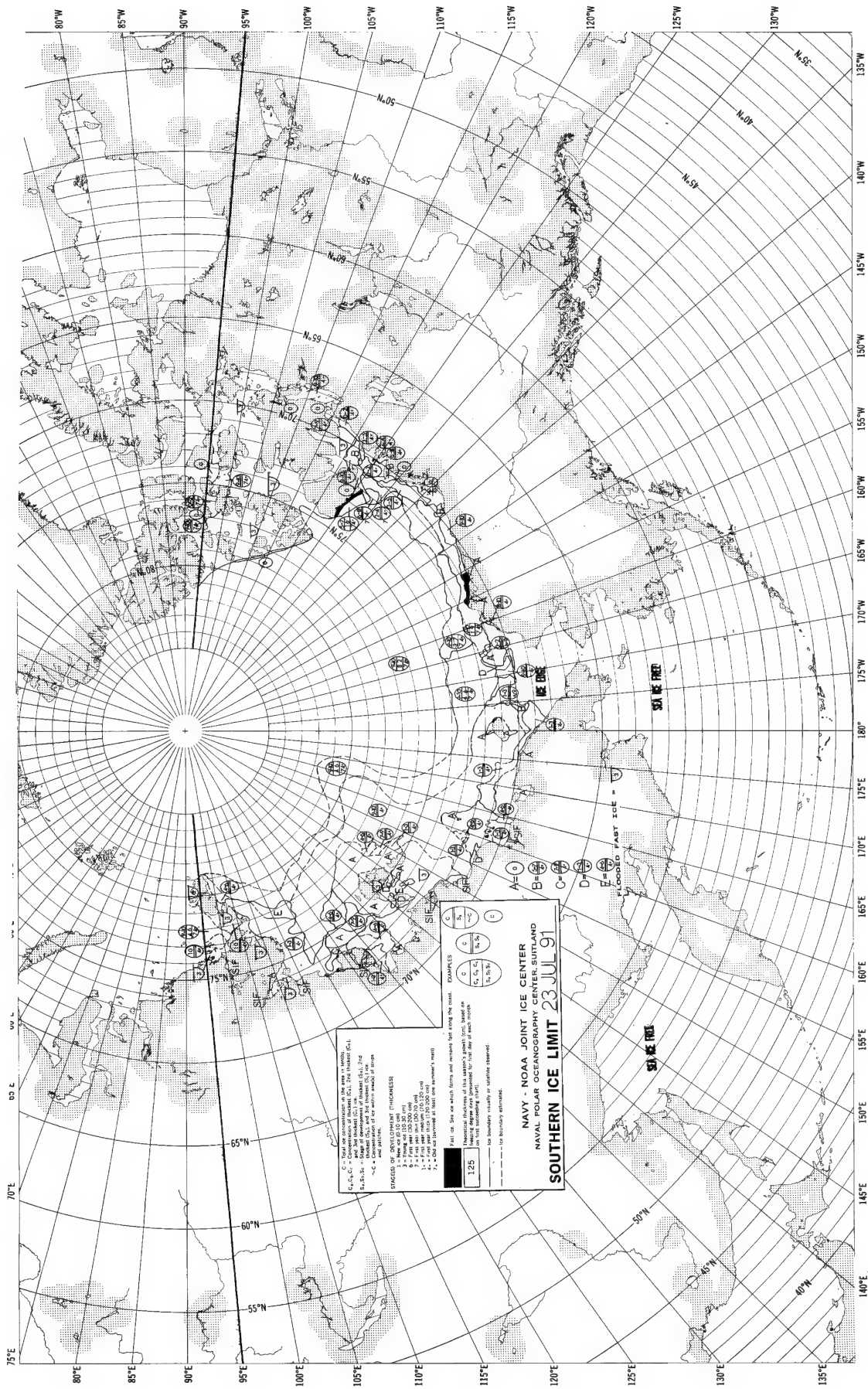


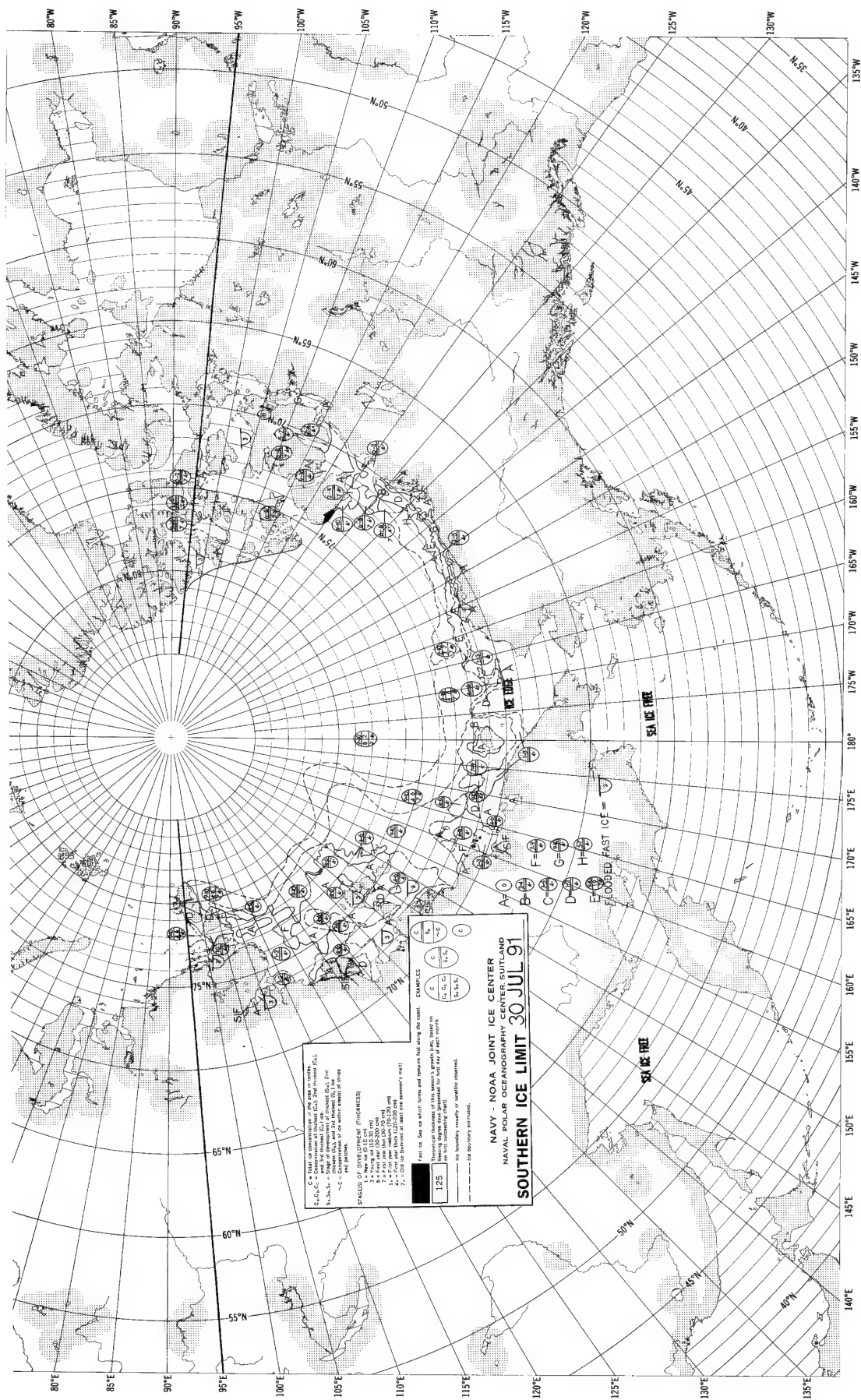


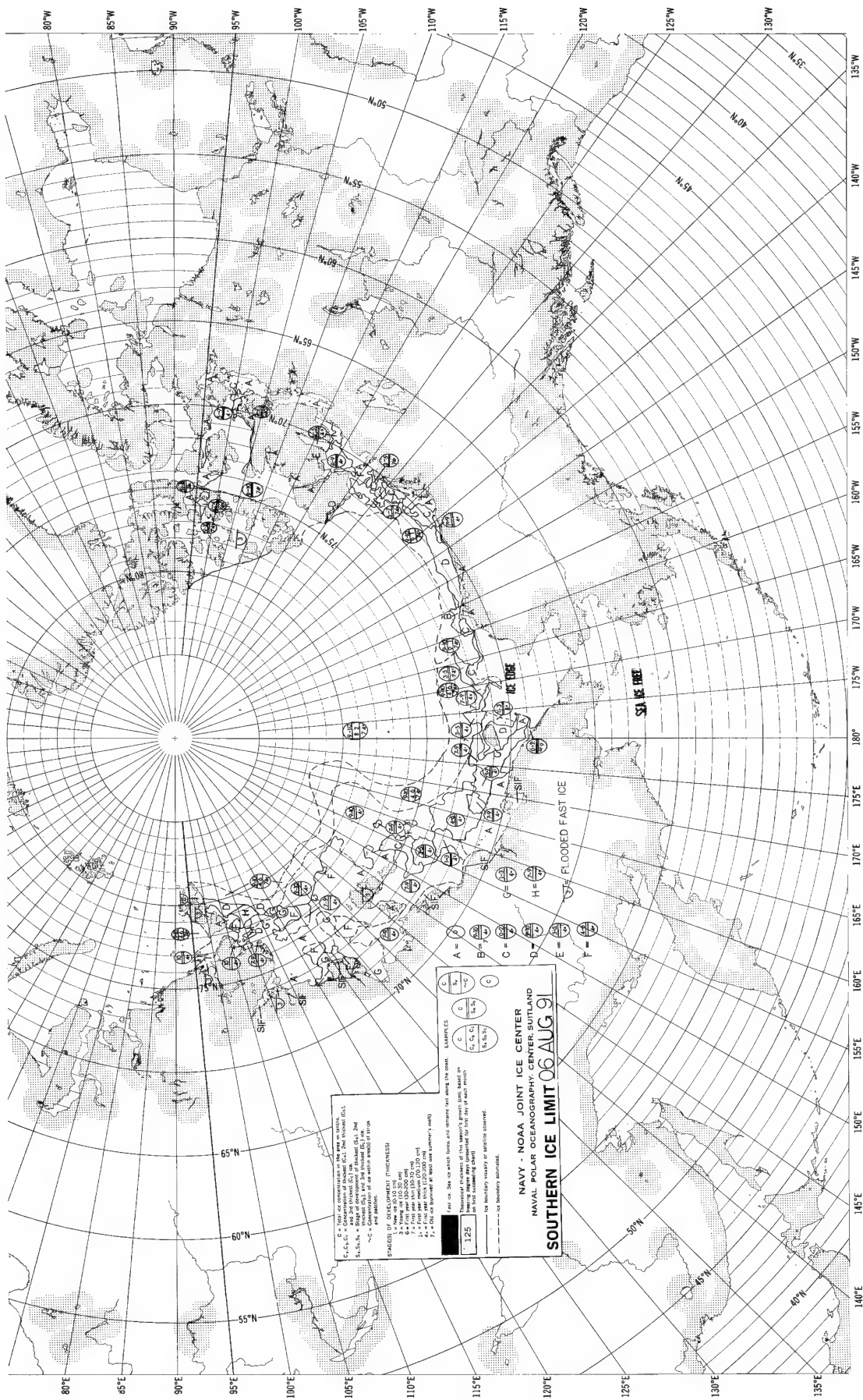


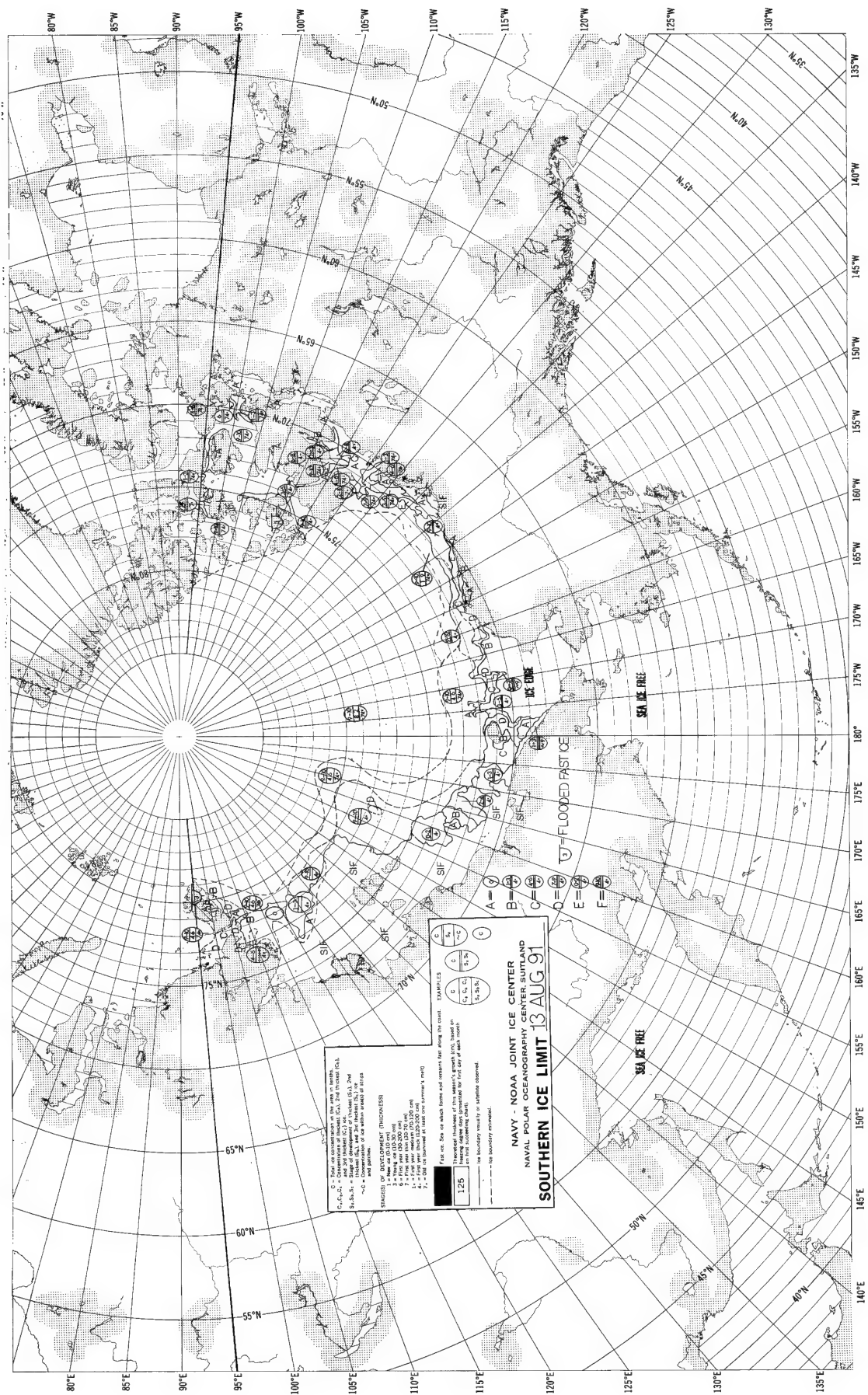


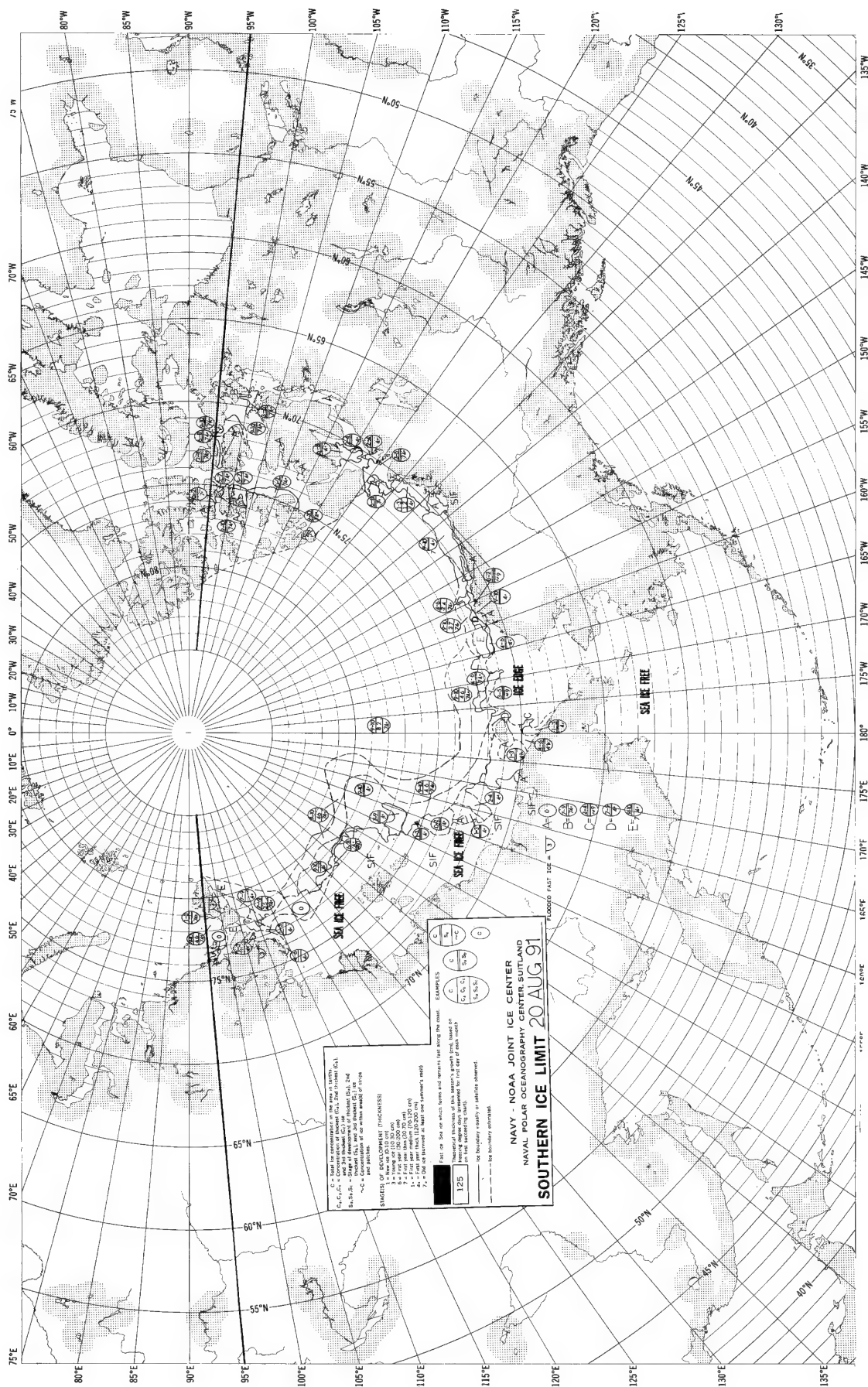


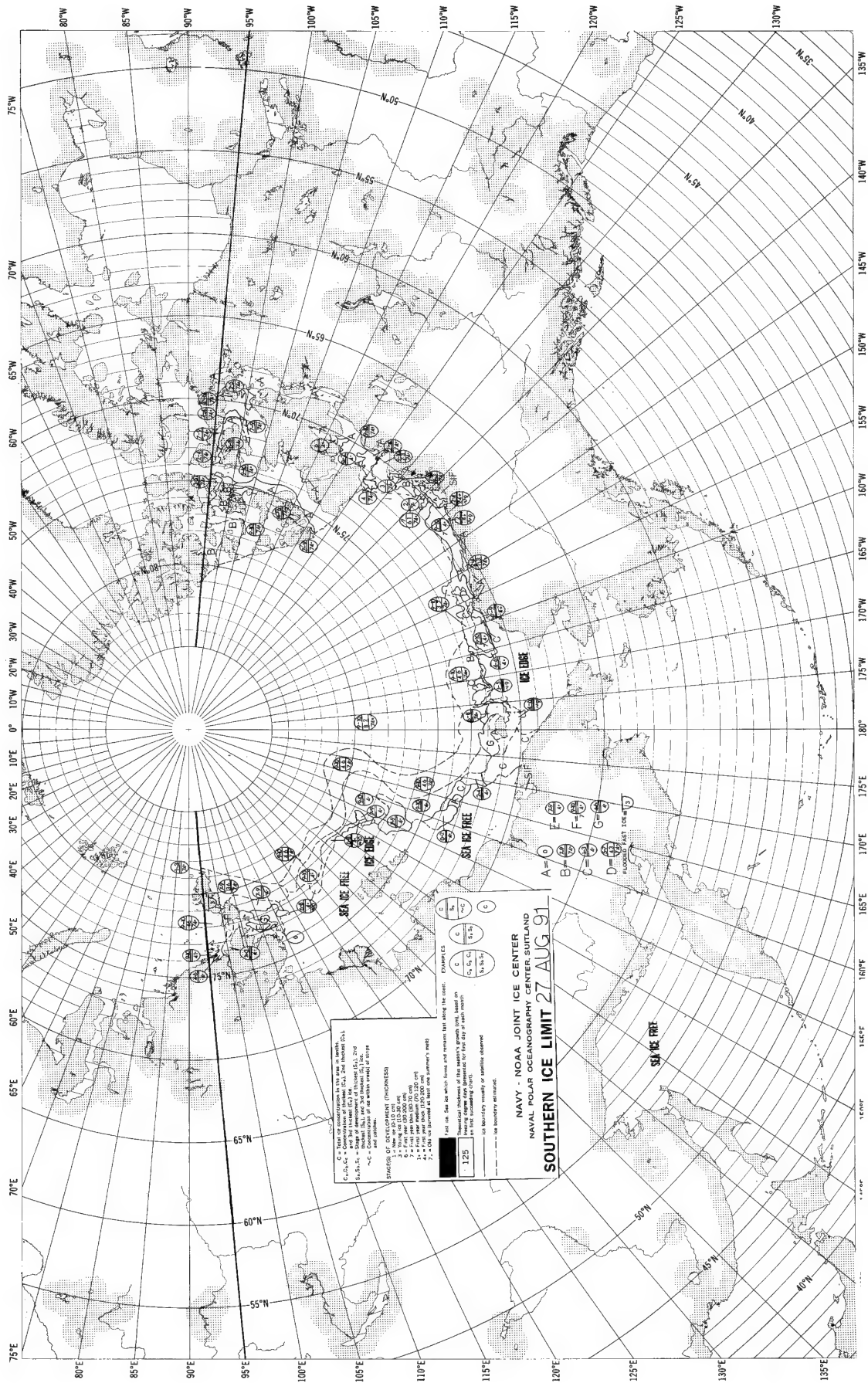


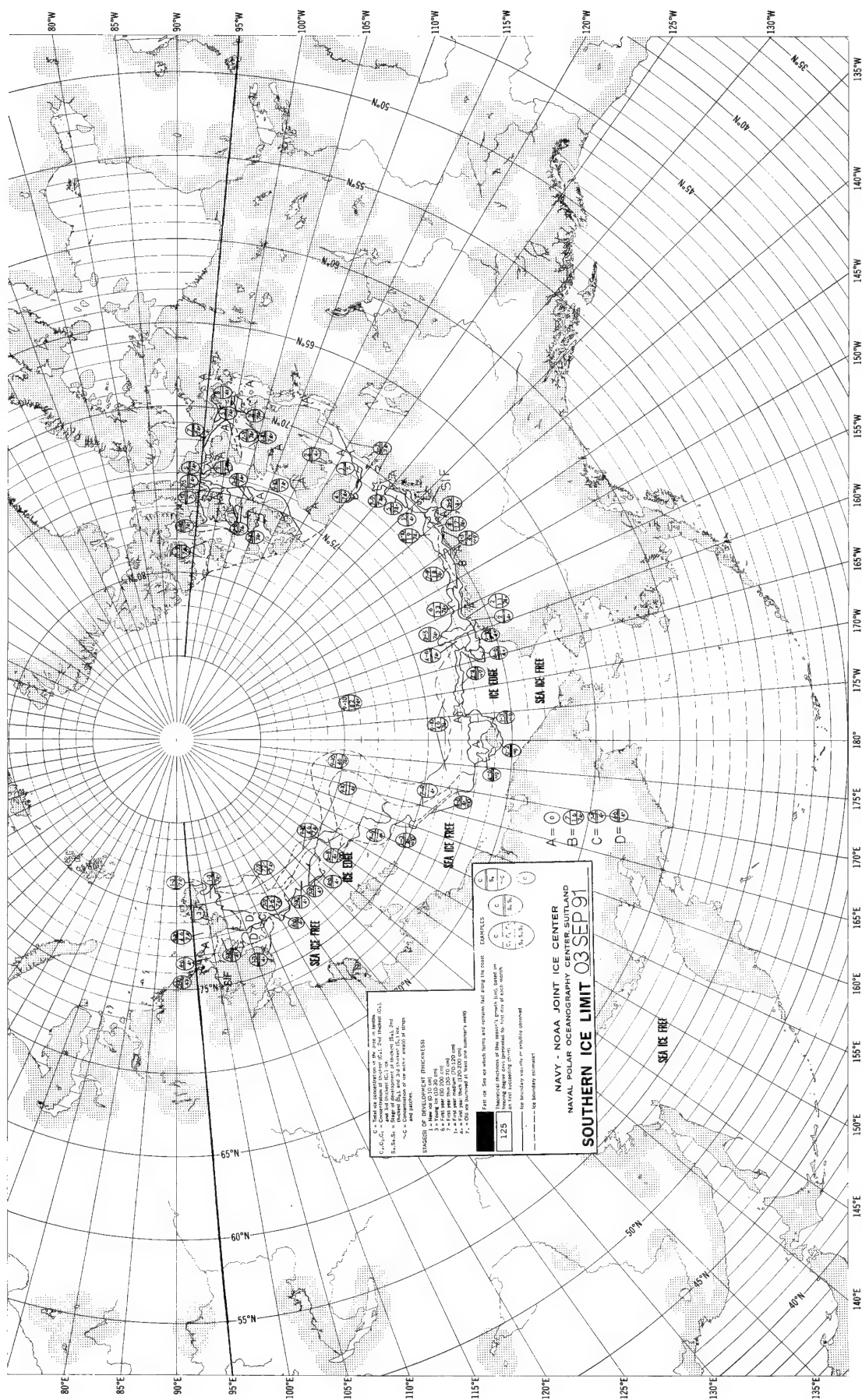


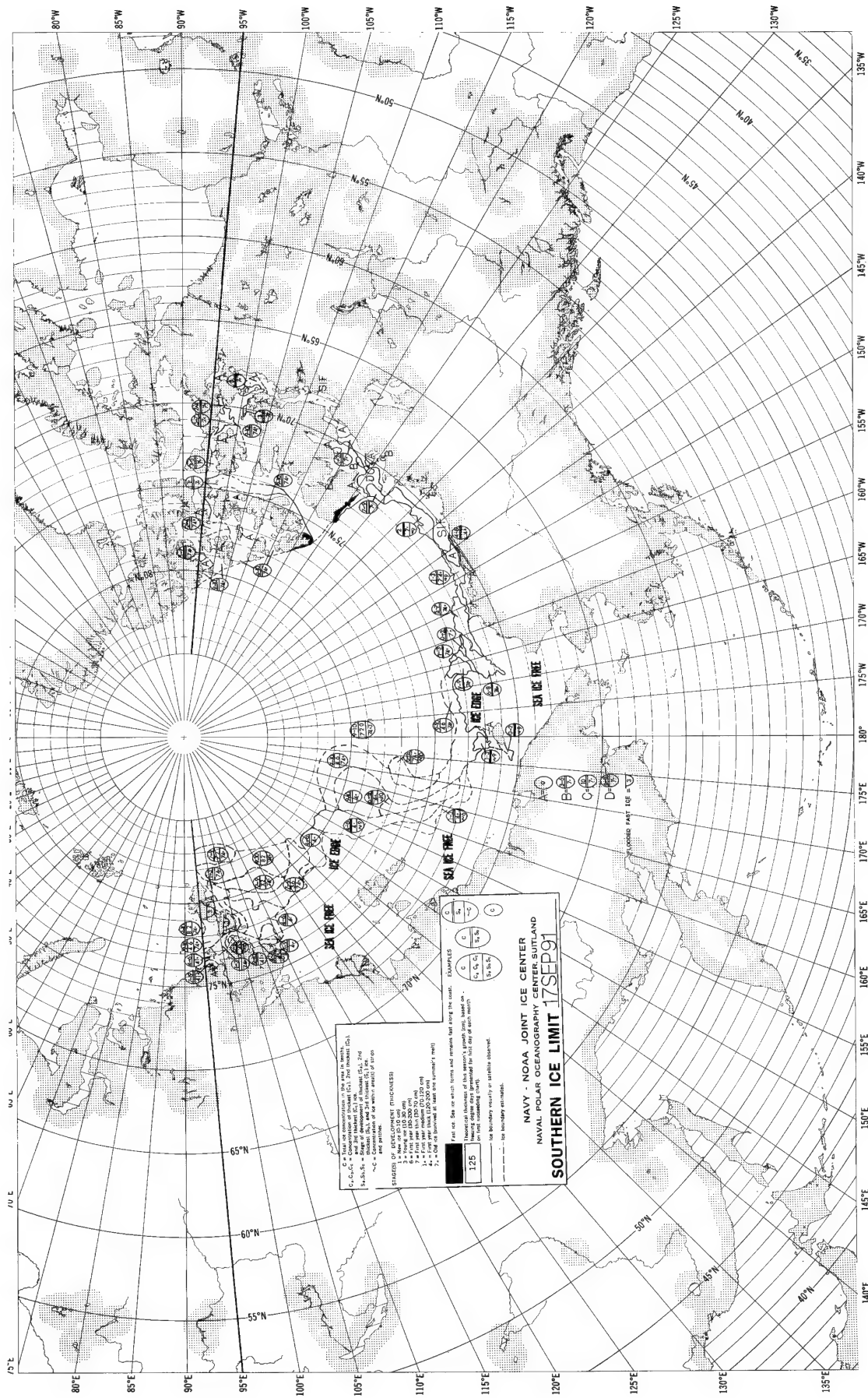


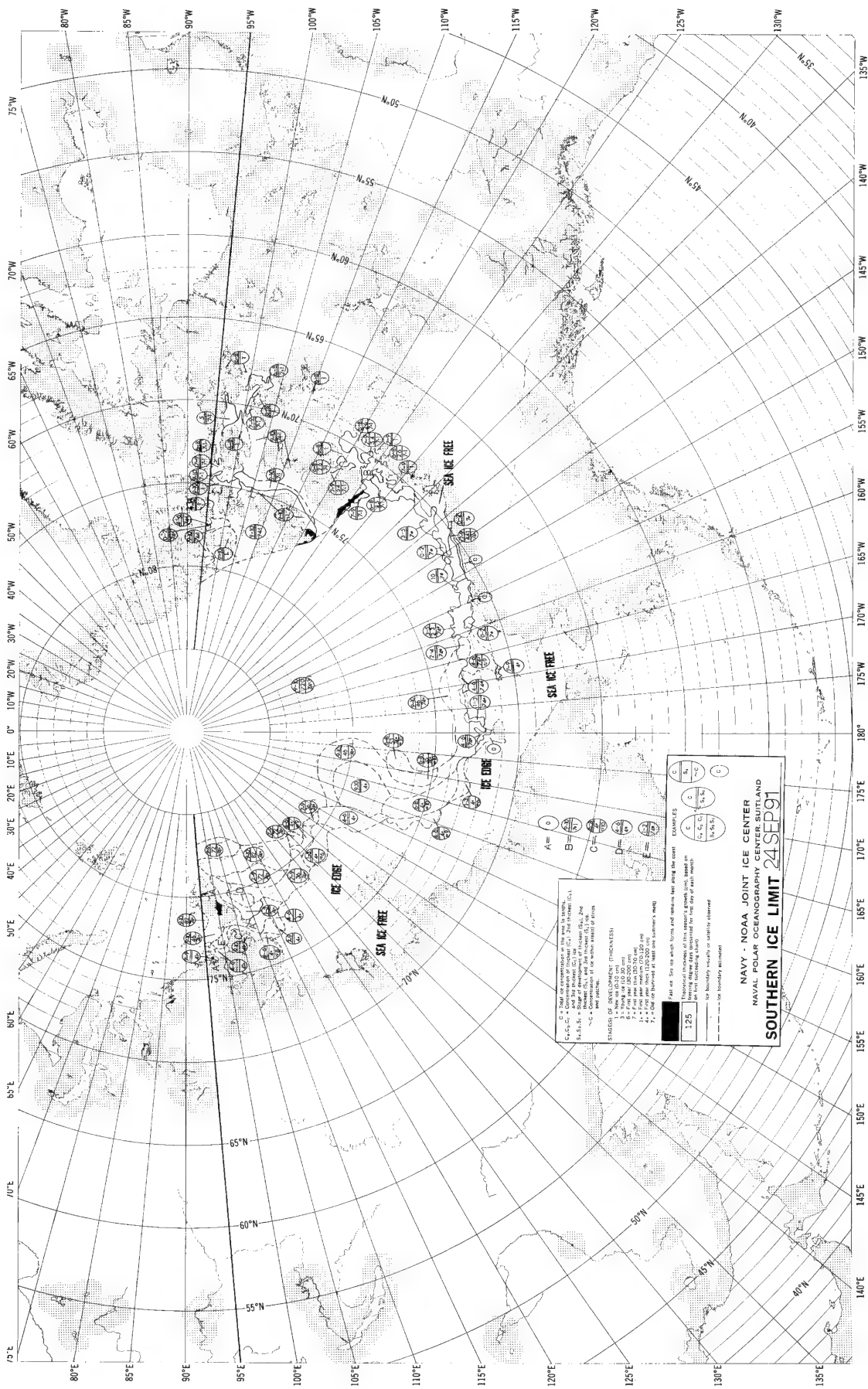








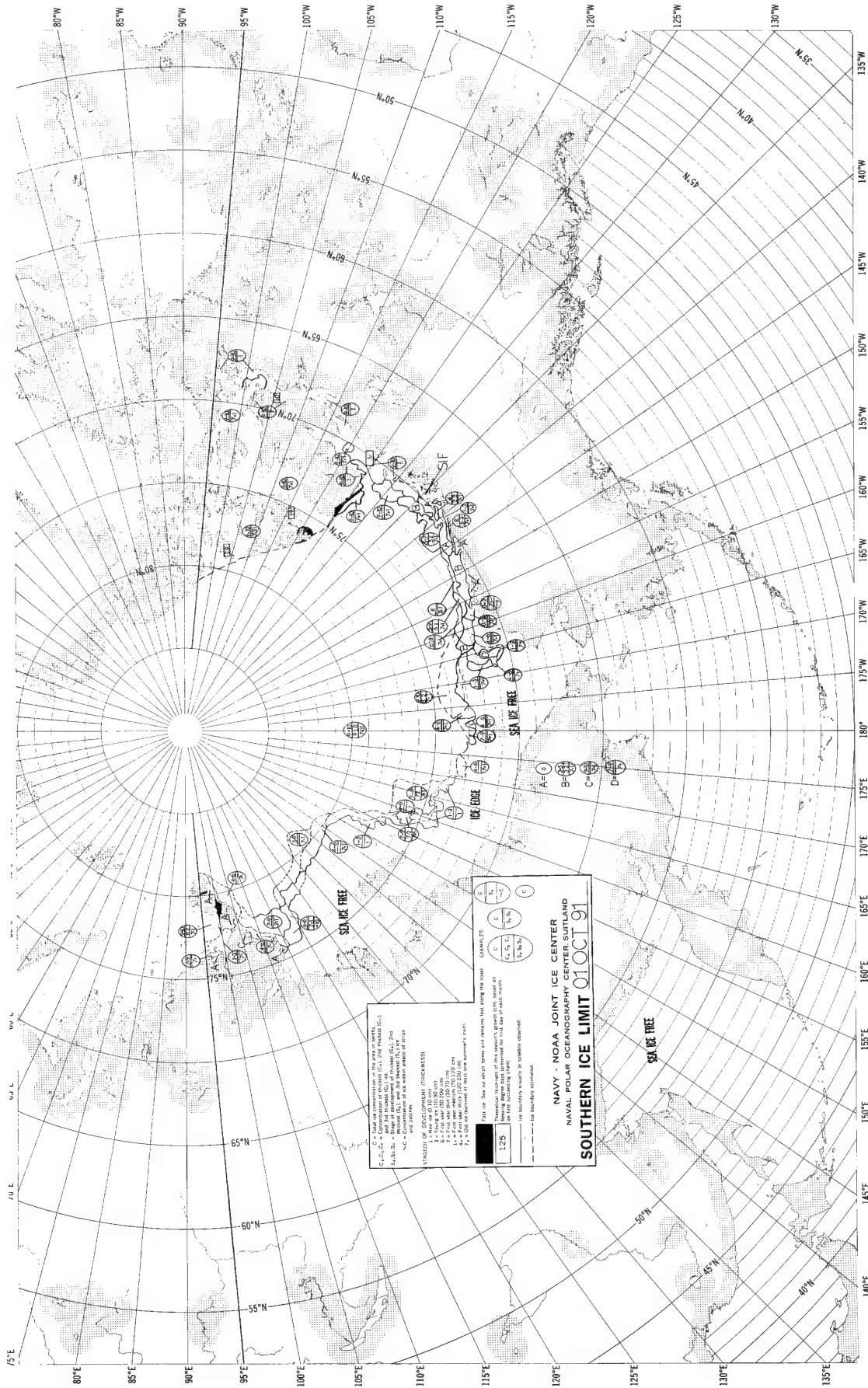


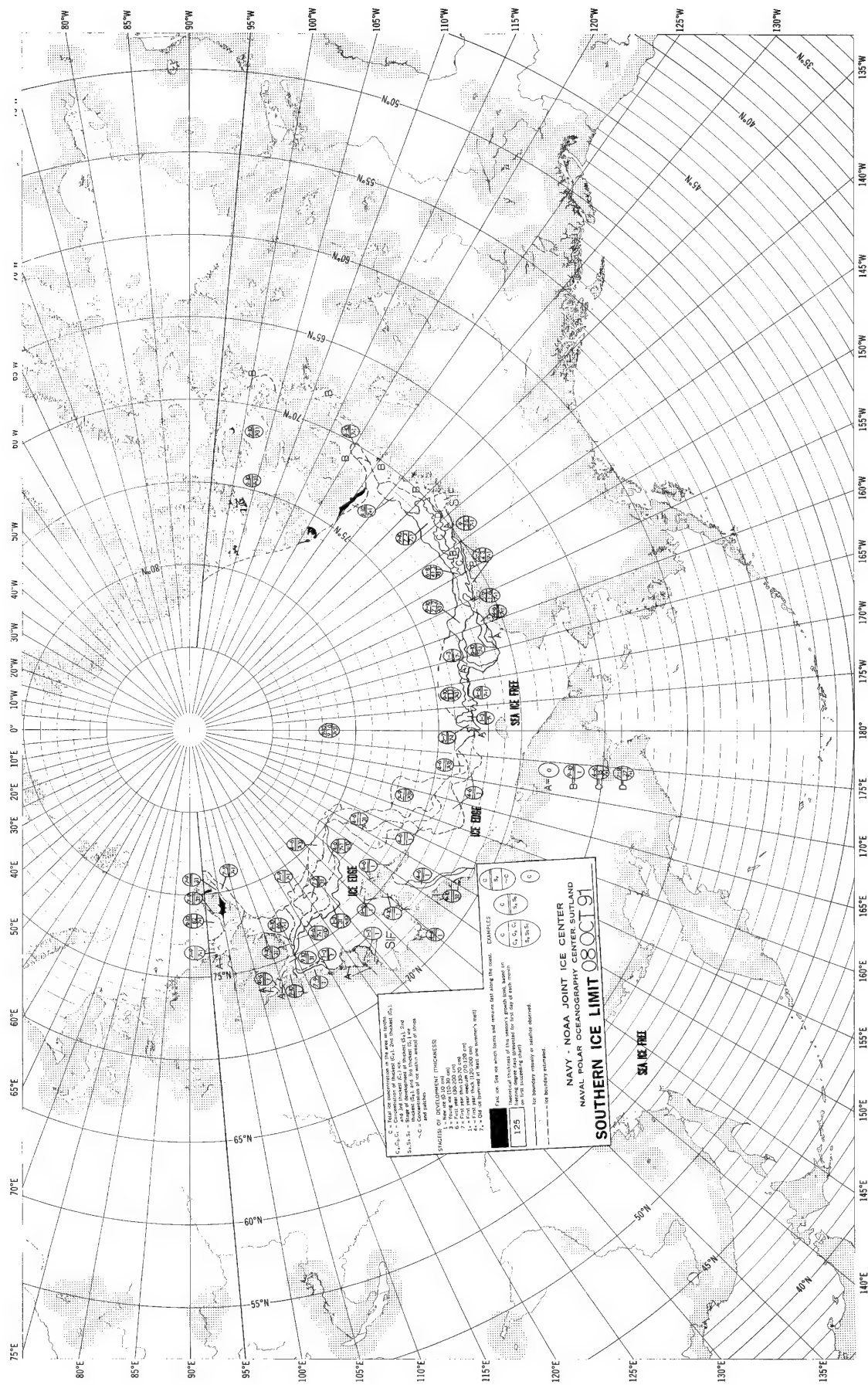


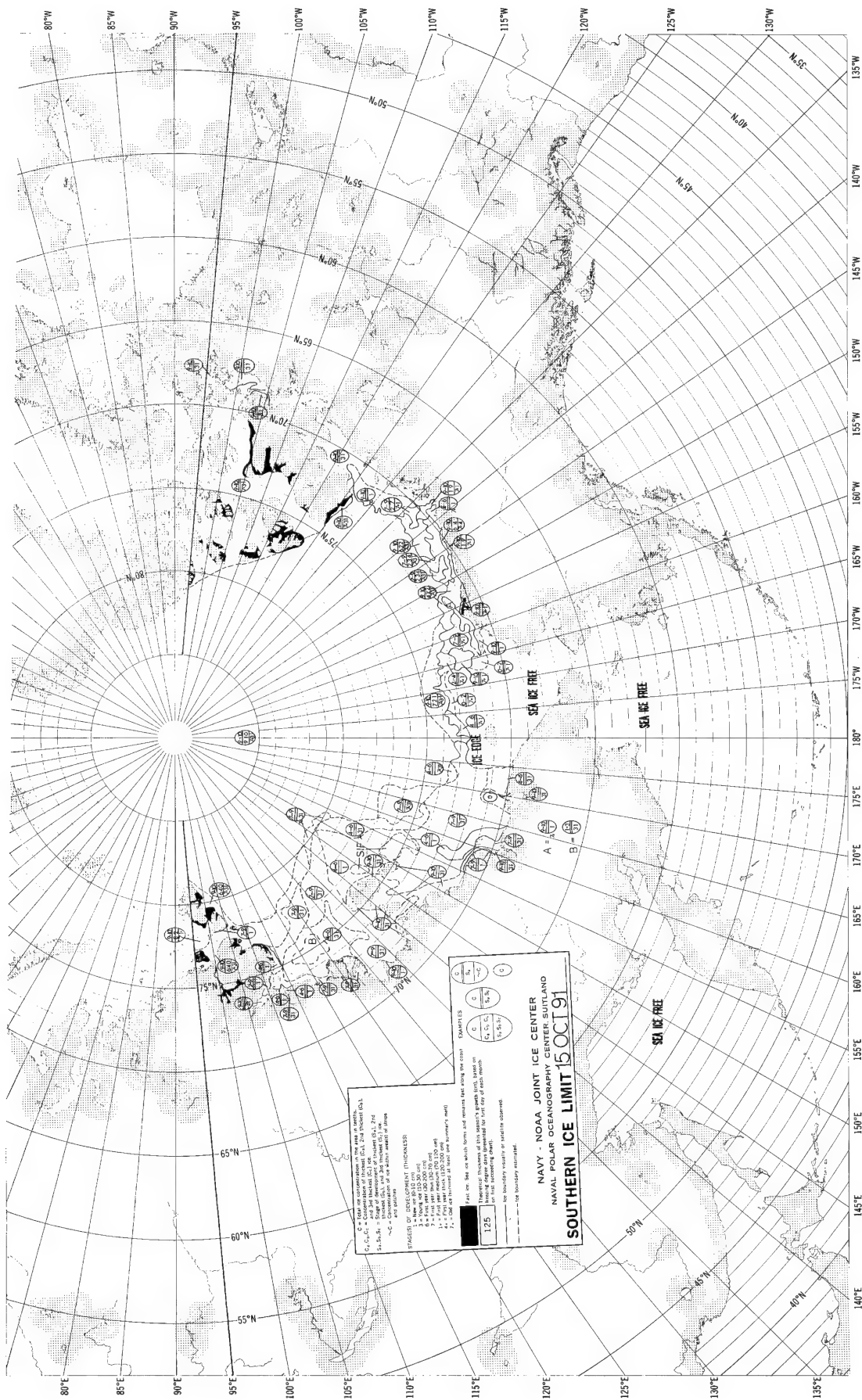
C = 100% ice concentration in the area to be shown.
 C₁, C₂, C₃ = 10%, 20%, and 30% ice concentration (C₁ is the minimum and C₃ is the maximum).
 C₁, C₂, C₃ = 10%, 20%, and 30% ice concentration (C₁ is the minimum and C₃ is the maximum).
 C₁, C₂, C₃ = 10%, 20%, and 30% ice concentration (C₁ is the minimum and C₃ is the maximum).
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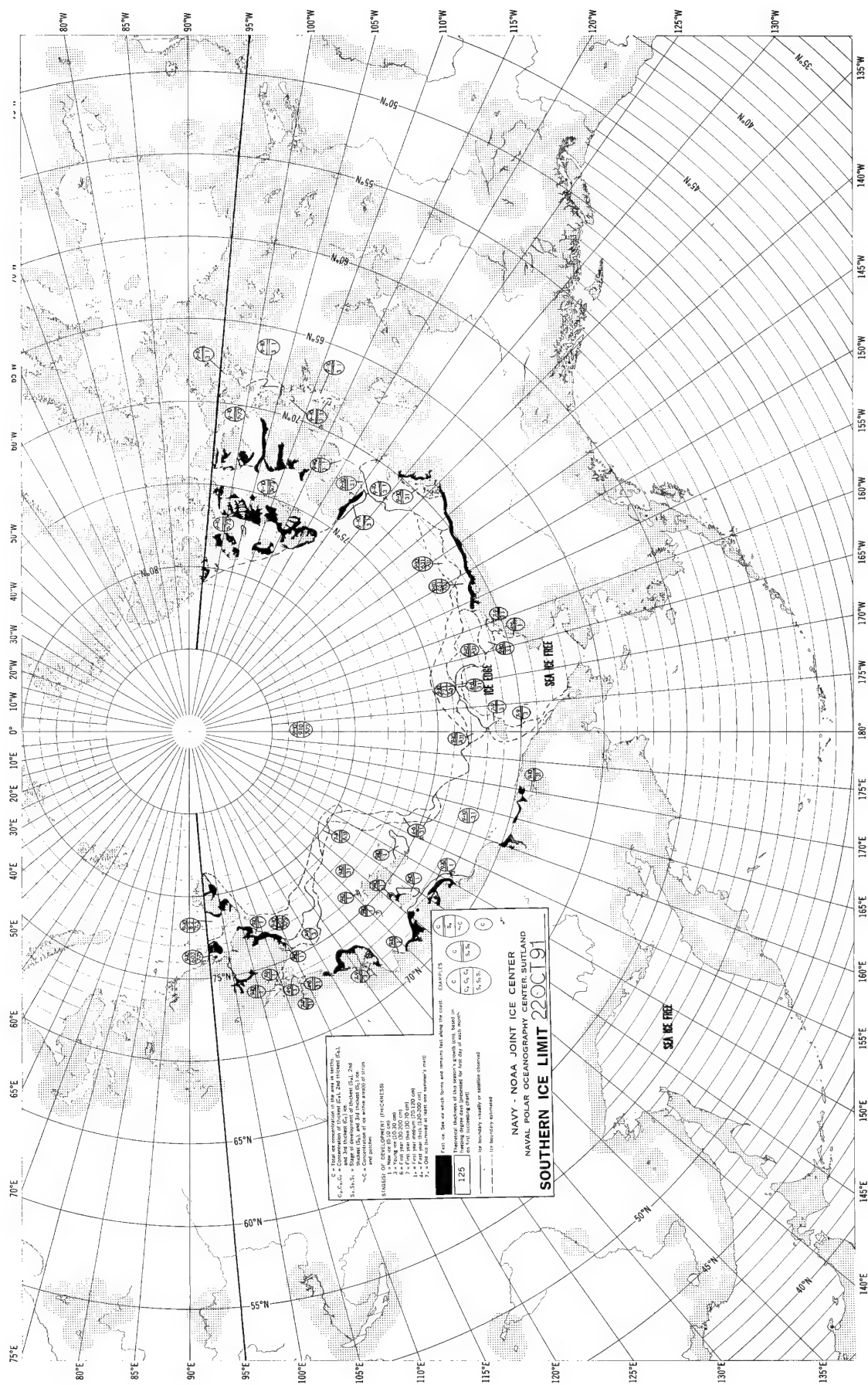
STAGES OF DEVELOPMENT (THICKNESS)
 1 = Young ice (10-15 cm)
 2 = First year ice (15-30 cm)
 3 = Second year ice (30-50 cm)
 4 = Third year ice (50-100 cm)
 5 = Fourth year ice (100-200 cm)
 6 = Fifth year ice (200-300 cm)
 7 = Sixth year ice (300-400 cm)
 8 = Seventh year ice (400-500 cm)
 9 = Eighth year ice (500-600 cm)
 10 = Ninth year ice (600-700 cm)
 11 = Tenth year ice (700-800 cm)
 12 = Eleventh year ice (800-900 cm)
 13 = Twelfth year ice (900-1000 cm)

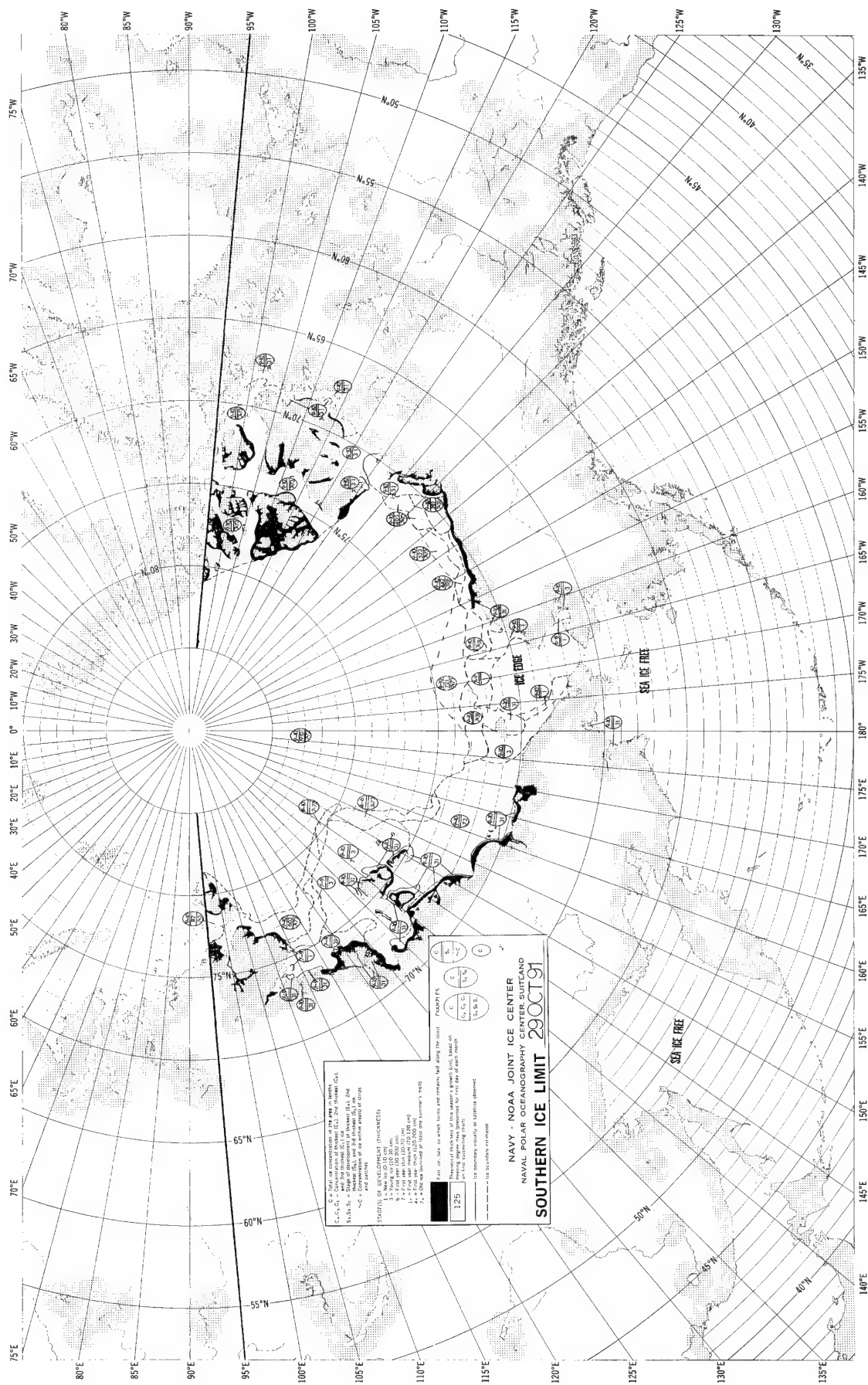
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 SOUTHERN ICE LIMIT 24 SEP 91

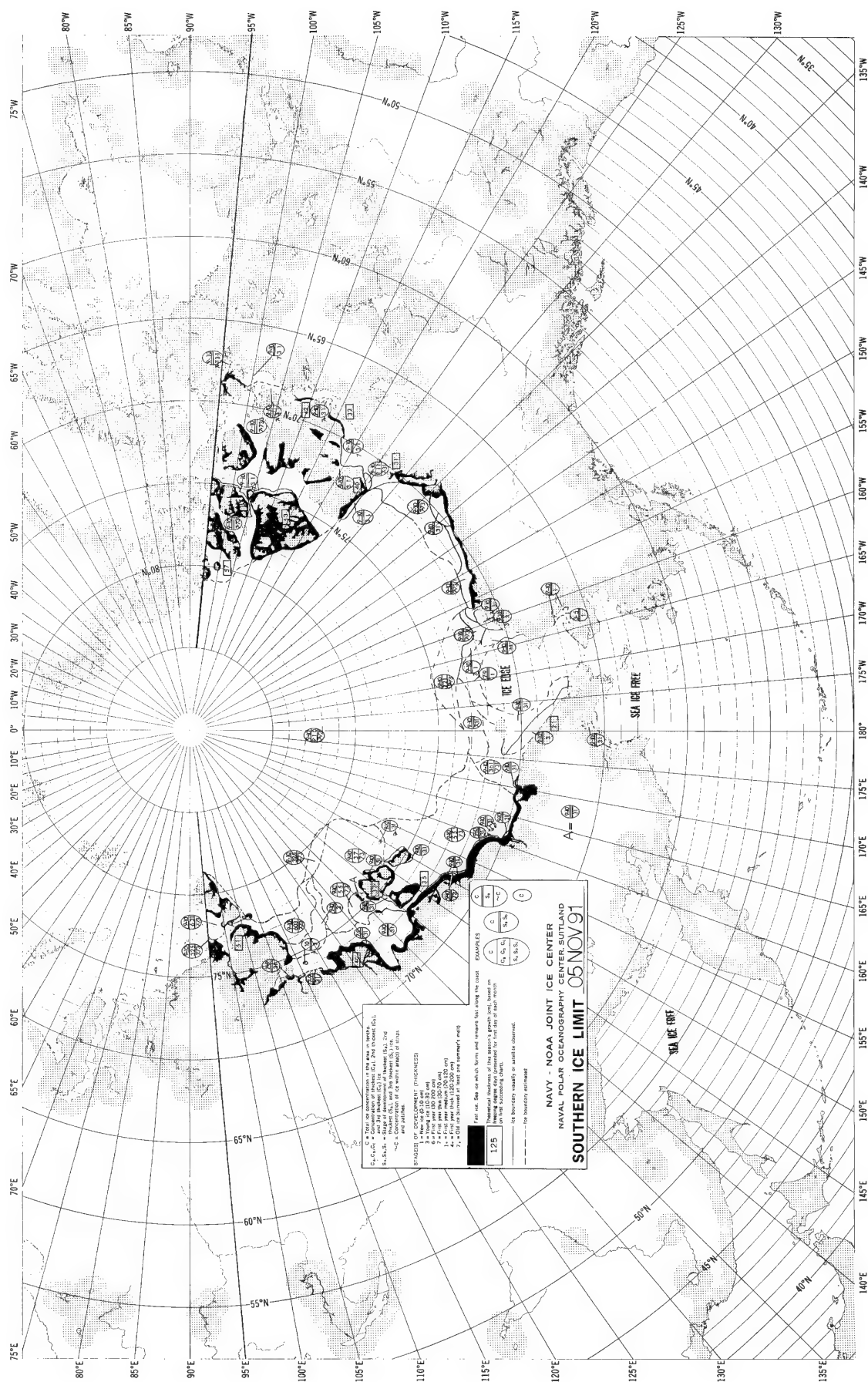


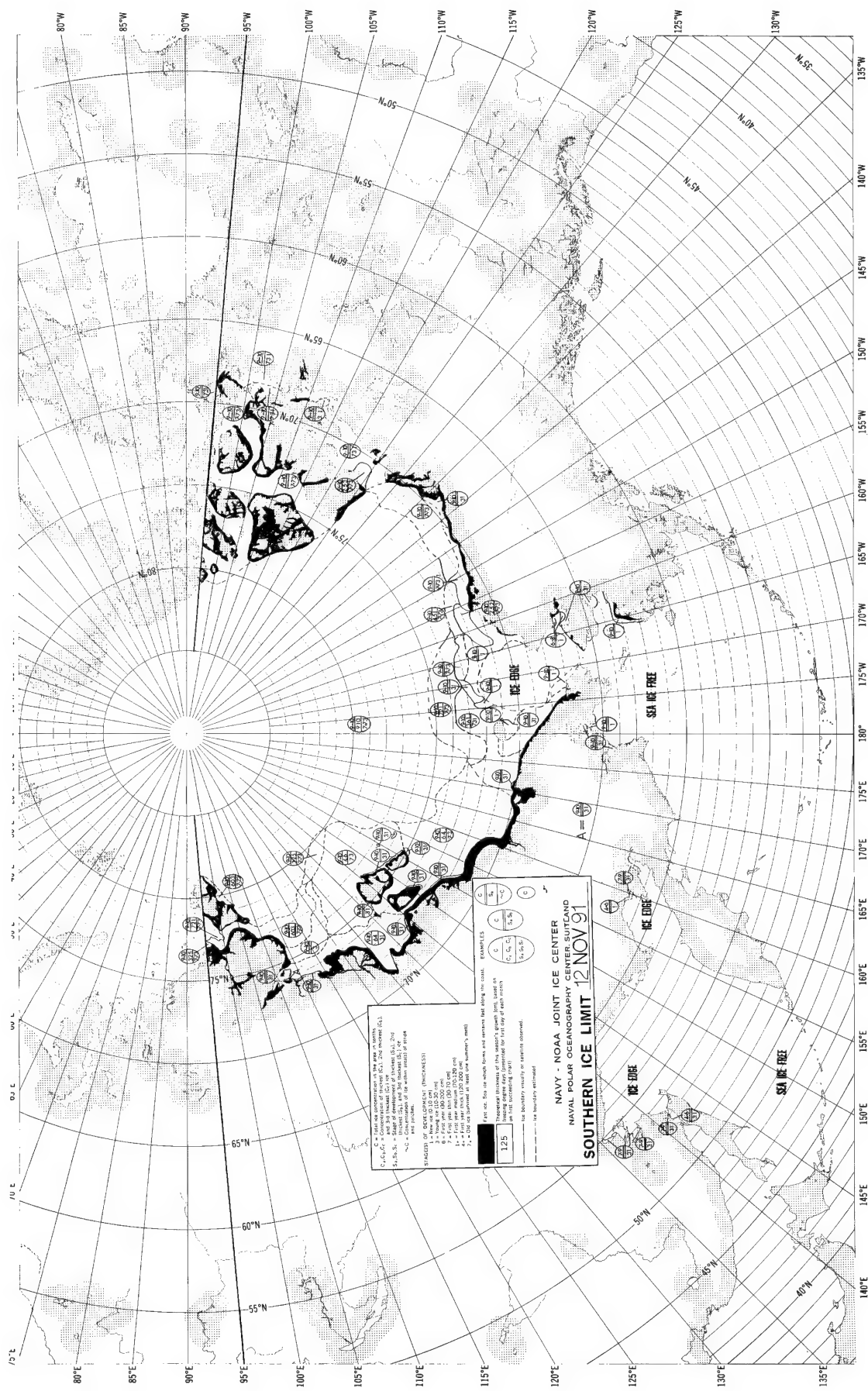


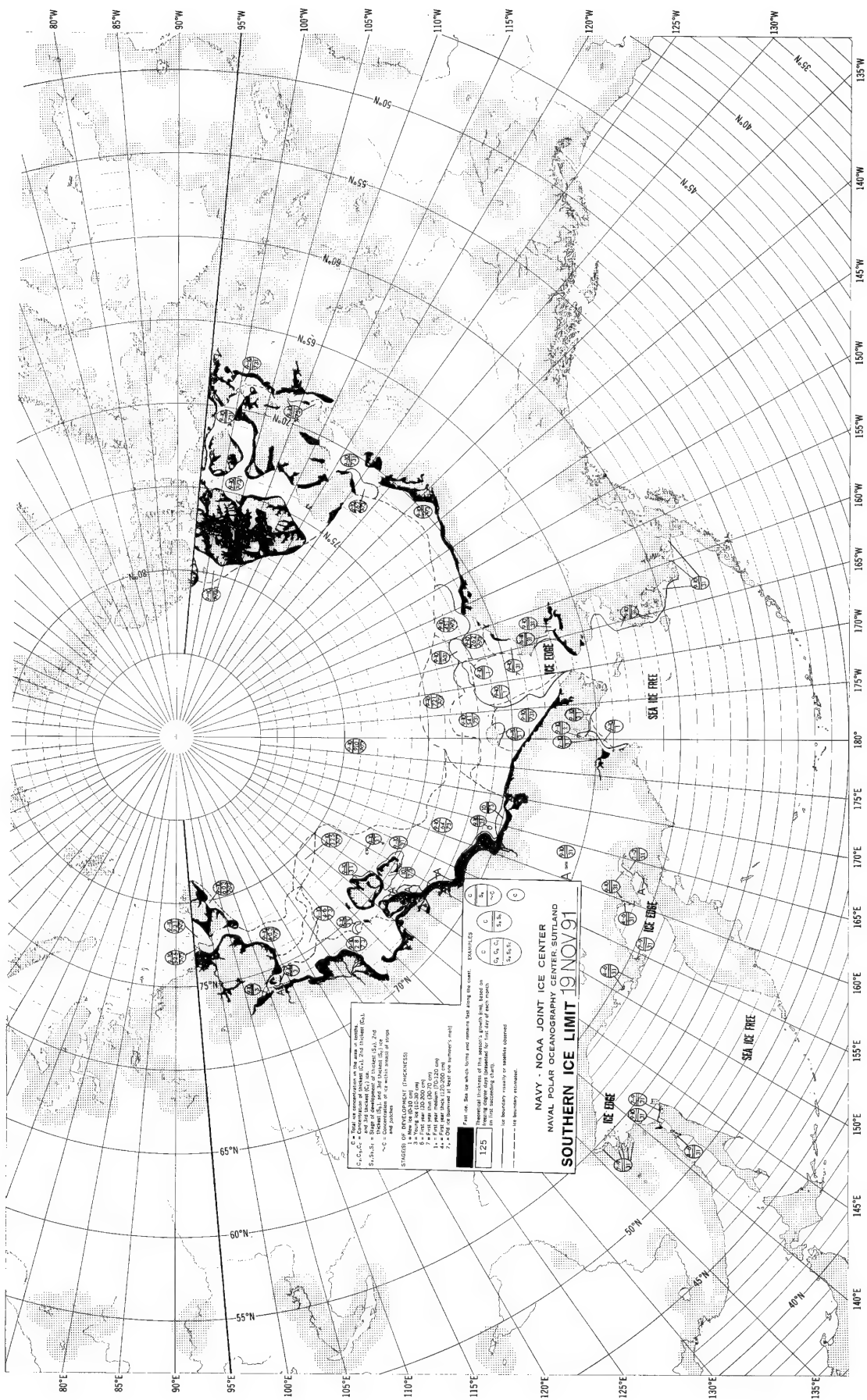












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SOUTHERN ICE LIMIT 19 NOV 91

SYMBOLS

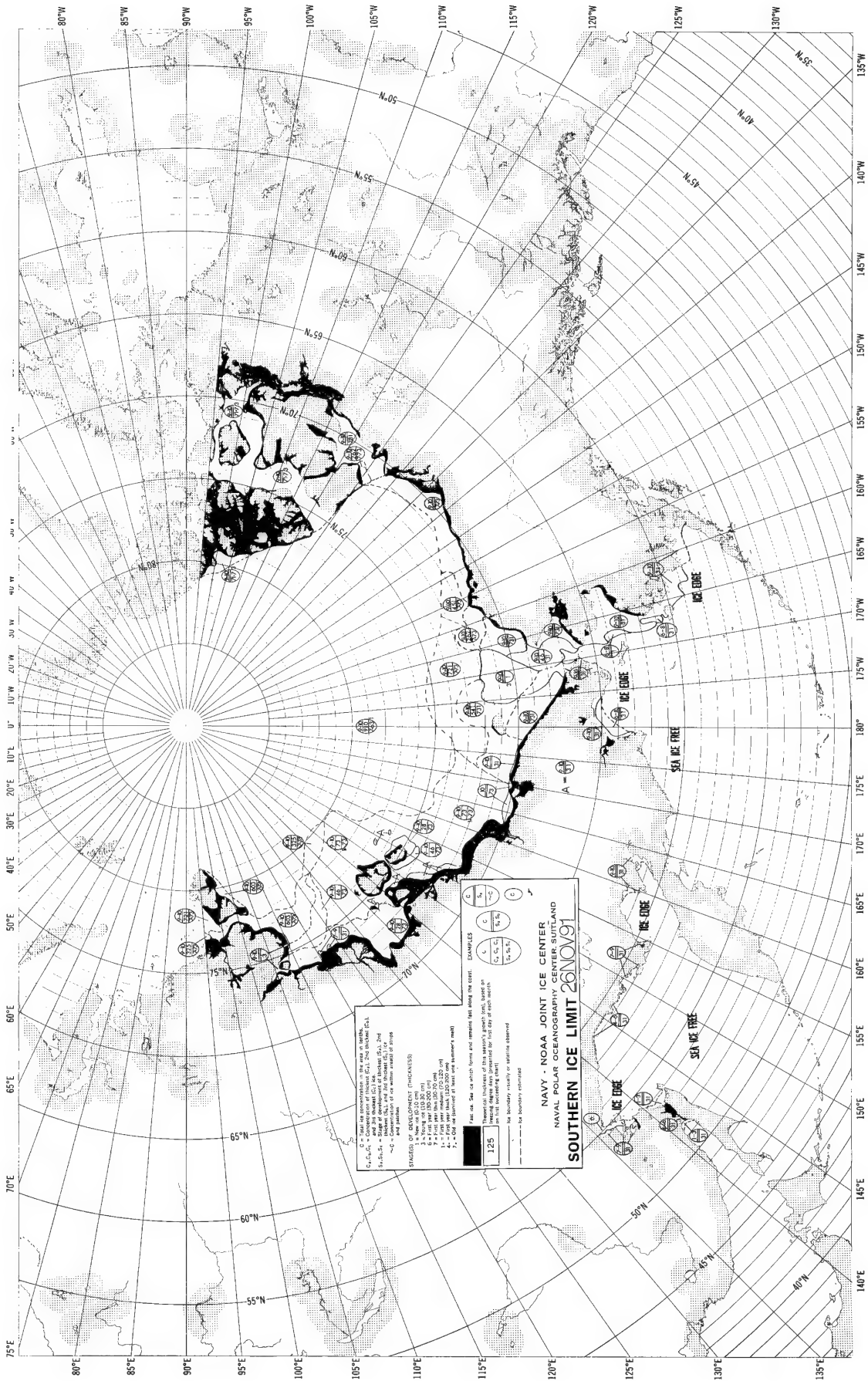
C = Data on concentration of the ice in percent
 C₁, C₂, C₃ = Concentration of ice in percent (C₁, 2nd thickness (C₂), 3rd thickness (C₃))
 S₁, S₂, S₃ = Range of development of thickness (S₁, 2nd thickness (S₂), 3rd thickness (S₃))
 *C = Concentration of ice in percent
 *S = Range of development of thickness

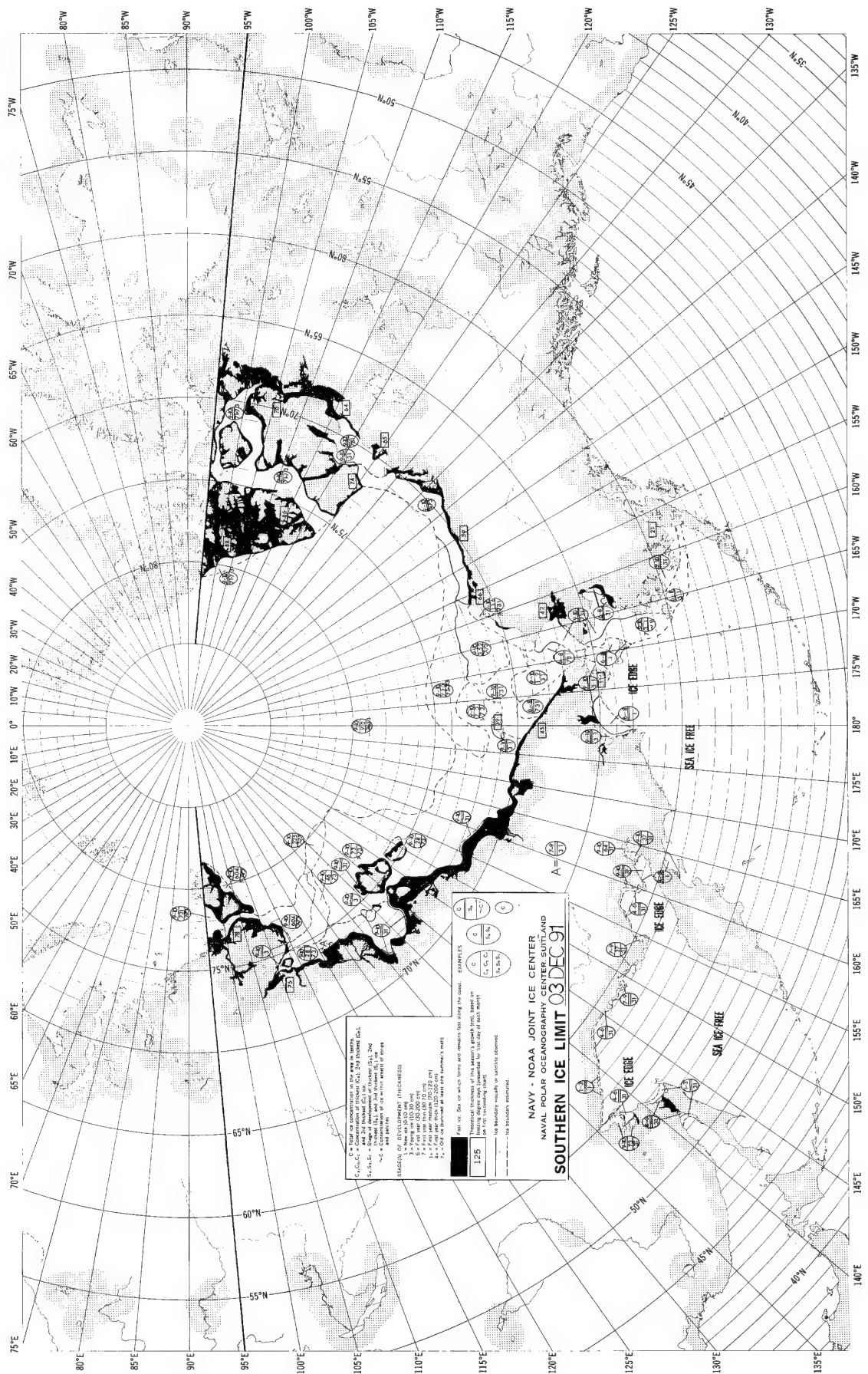
STAGES OF DEVELOPMENT (THICKNESS)

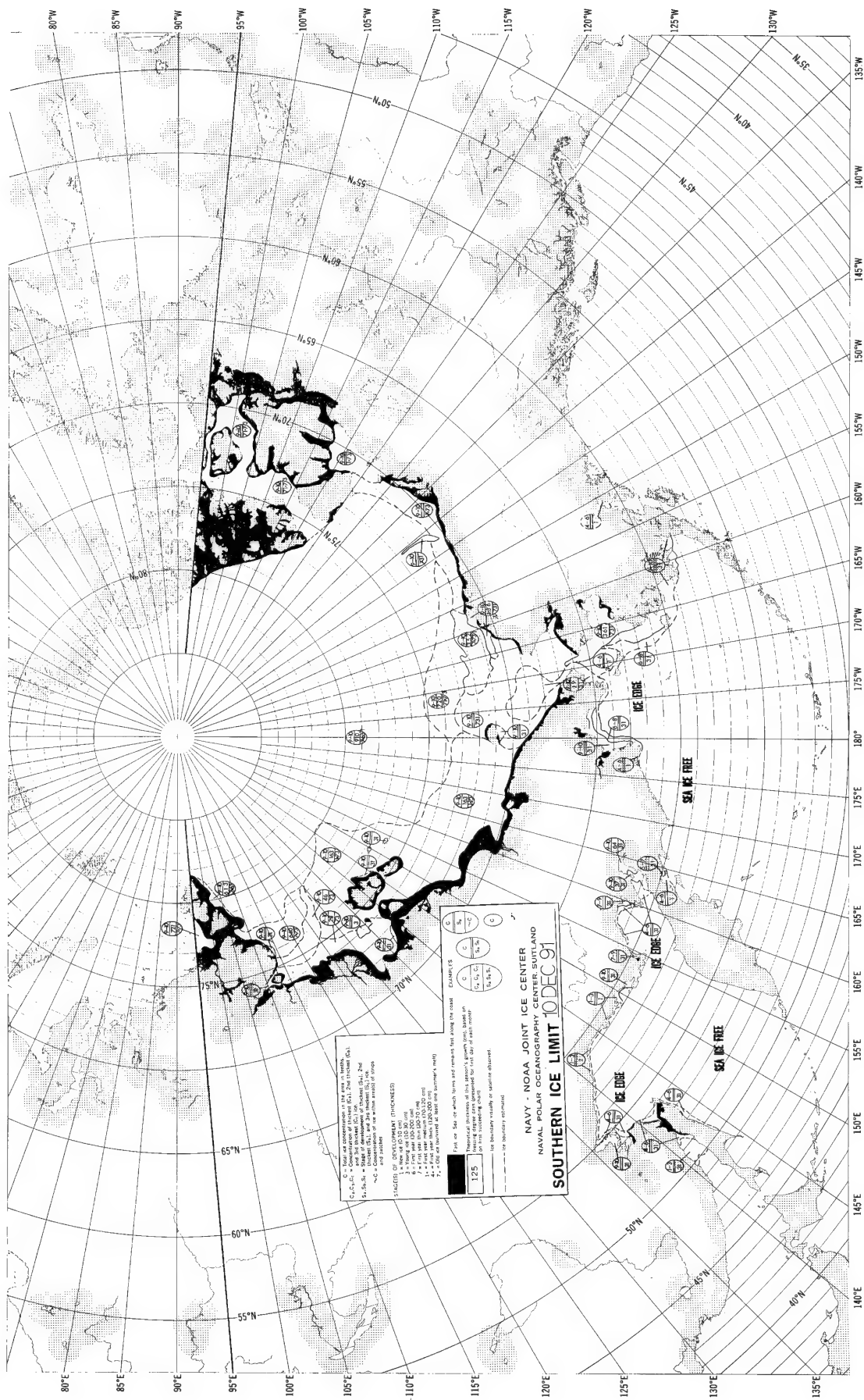
1 = New ice (0-100 cm)
 2 = First year (100-200 cm)
 3 = First year medium (200-300 cm)
 4 = First year old (300-400 cm)
 5 = Old ice (400-600 cm)
 6 = Old ice (600-800 cm)
 7 = Old ice (800-1000 cm)

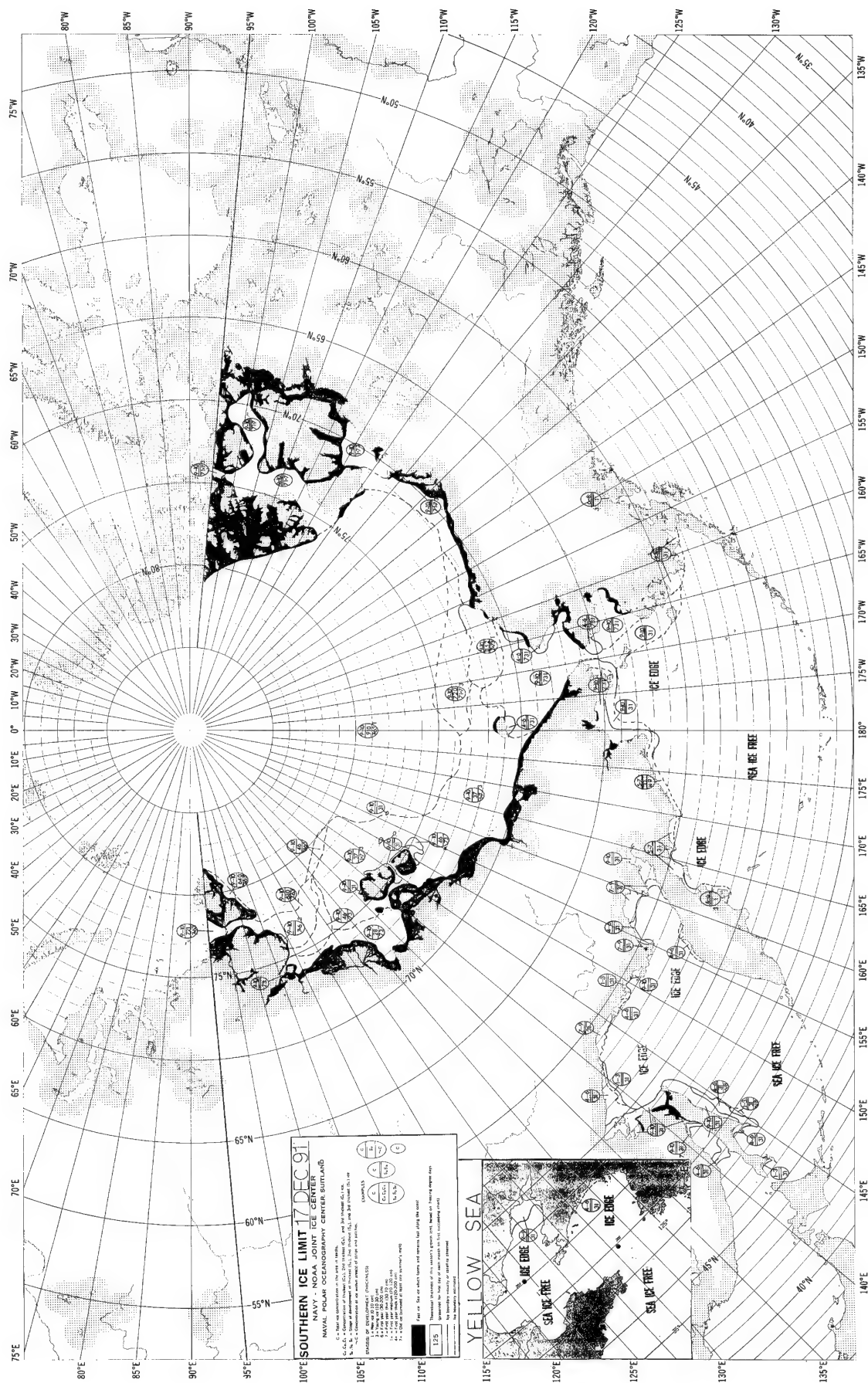
EXPLANATIONS

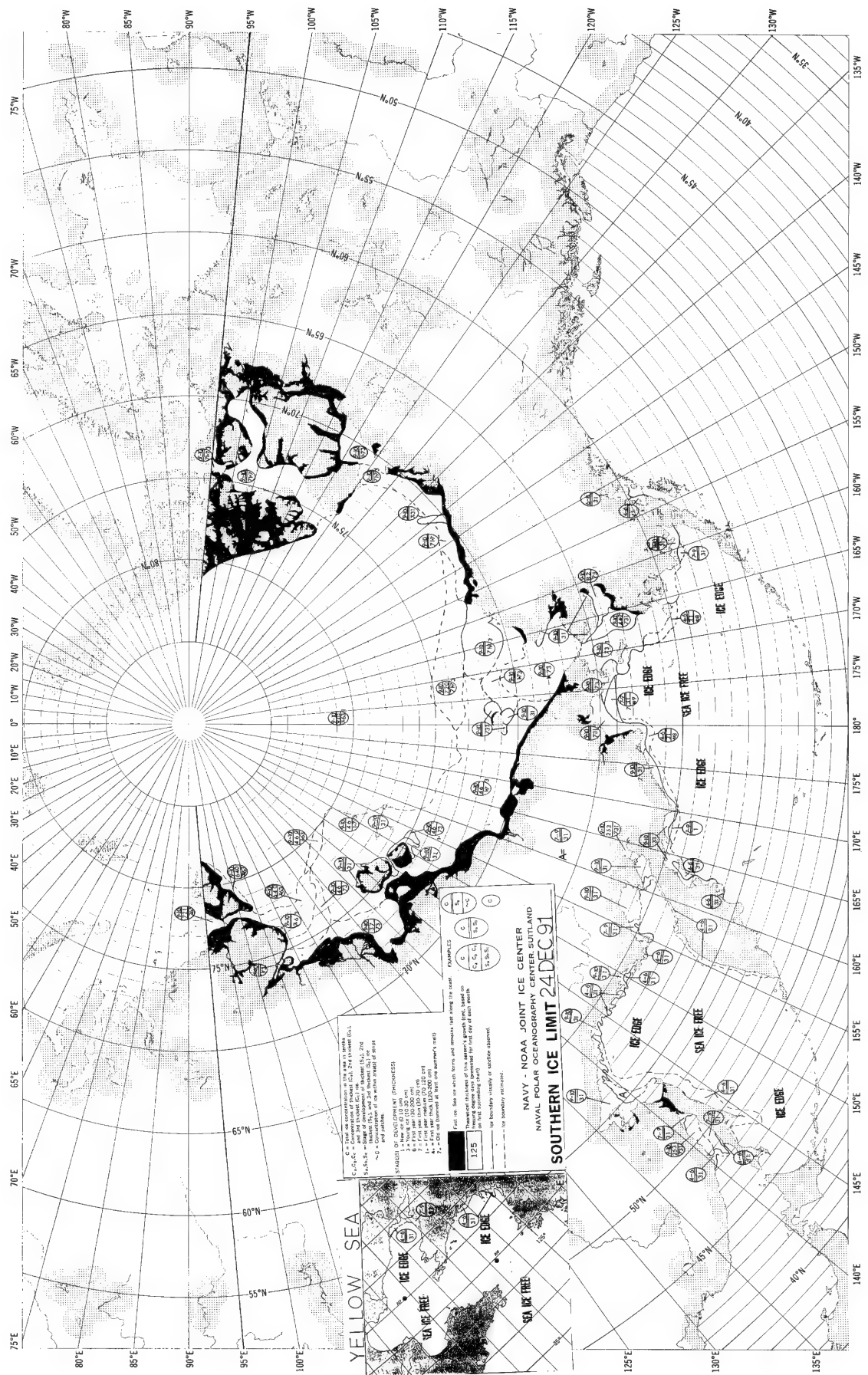
125 = Thickness of ice in meters (125 meters thick)
 125 = Thickness of ice in feet (125 feet thick)
 125 = Thickness of ice in meters (125 meters thick)
 125 = Thickness of ice in feet (125 feet thick)
 125 = Thickness of ice in meters (125 meters thick)
 125 = Thickness of ice in feet (125 feet thick)

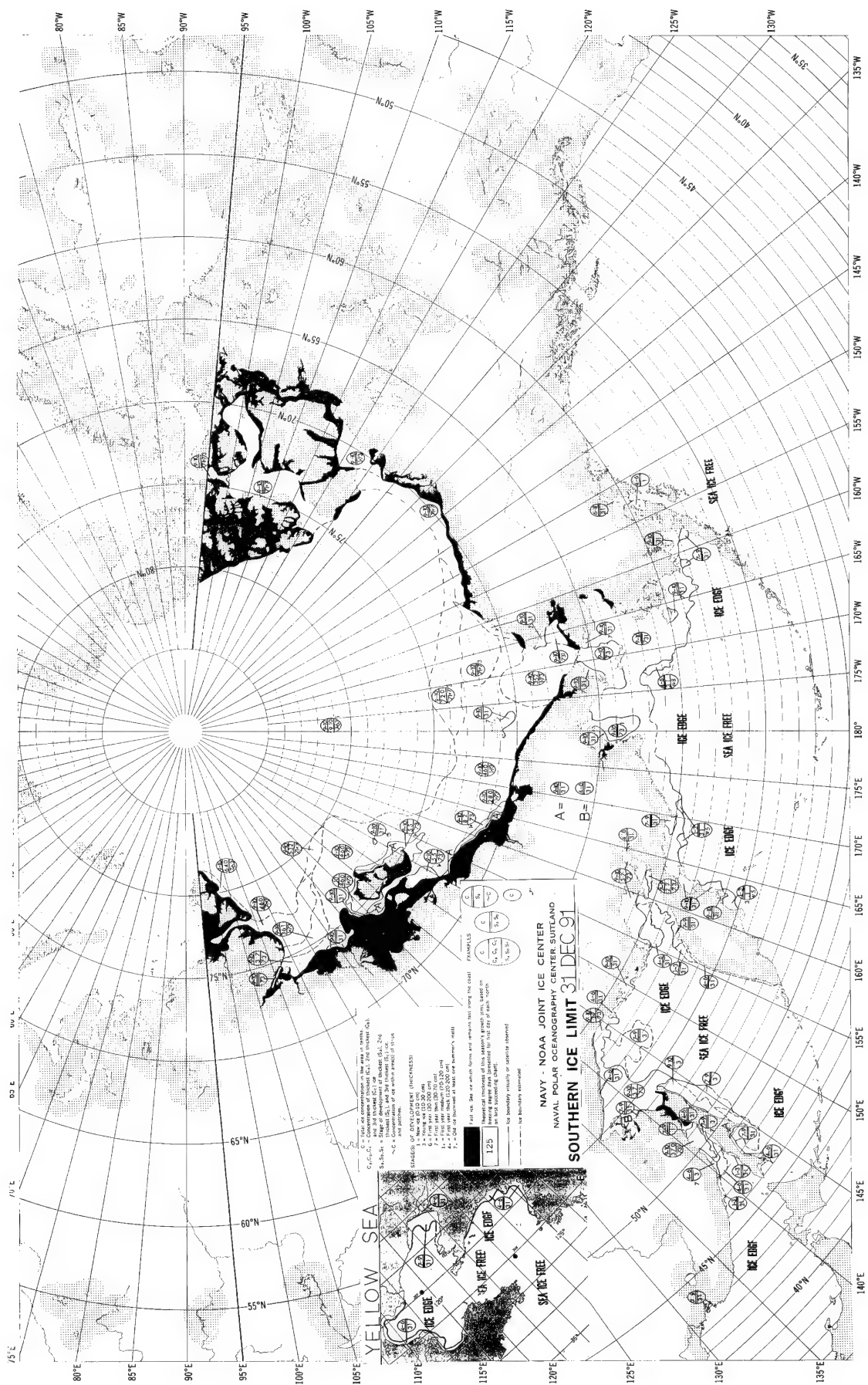


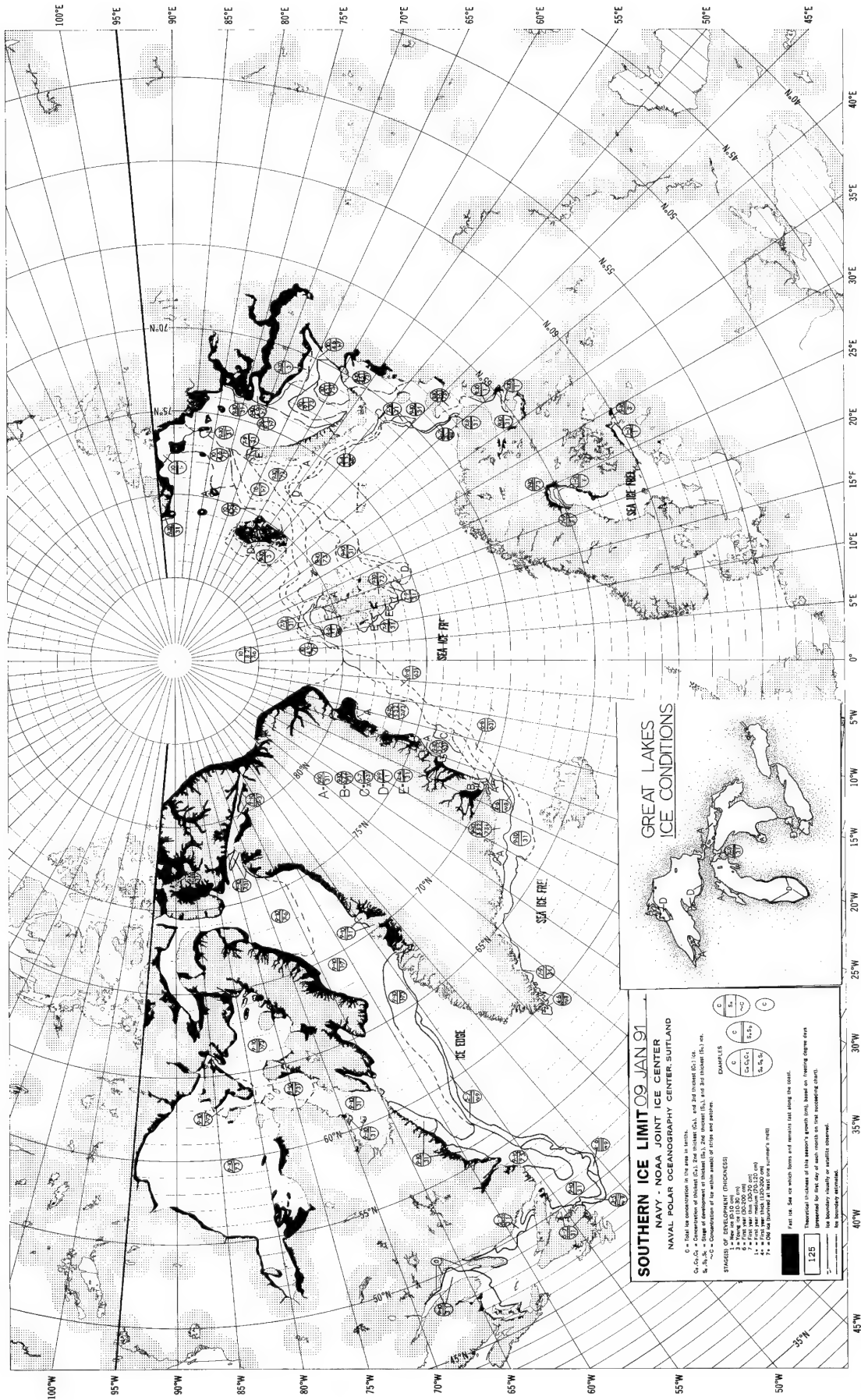












SOUTHERN ICE LIMIT 09 JAN 91

NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER, SUTCLIFF

0 = Total ice concentration in the area is less than 10%.
1 = Concentration of ice in the area is 10% to 20%.
2 = Concentration of ice in the area is 20% to 30%.
3 = Concentration of ice in the area is 30% to 40%.
4 = Concentration of ice in the area is 40% to 50%.
5 = Concentration of ice in the area is 50% to 60%.
6 = Concentration of ice in the area is 60% to 70%.
7 = Concentration of ice in the area is 70% to 80%.
8 = Concentration of ice in the area is 80% to 90%.
9 = Concentration of ice in the area is 90% to 100%.

STAGES OF DEVELOPMENT (THICKNESS)

- 1 = 1st year ice (less than 100 days old)
- 2 = 2nd year ice (100 to 200 days old)
- 3 = 3rd year ice (200 to 300 days old)
- 4 = 4th year ice (300 to 400 days old)
- 5 = 5th year ice (400 to 500 days old)
- 6 = 6th year ice (500 to 600 days old)
- 7 = 7th year ice (600 to 700 days old)
- 8 = 8th year ice (700 to 800 days old)
- 9 = 9th year ice (800 to 900 days old)
- 10 = 10th year ice (900 to 1000 days old)

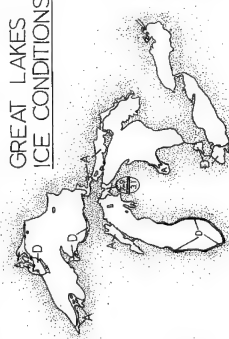
125 = Thickness of ice in meters (feet) along the coast.

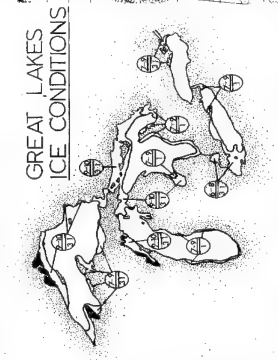
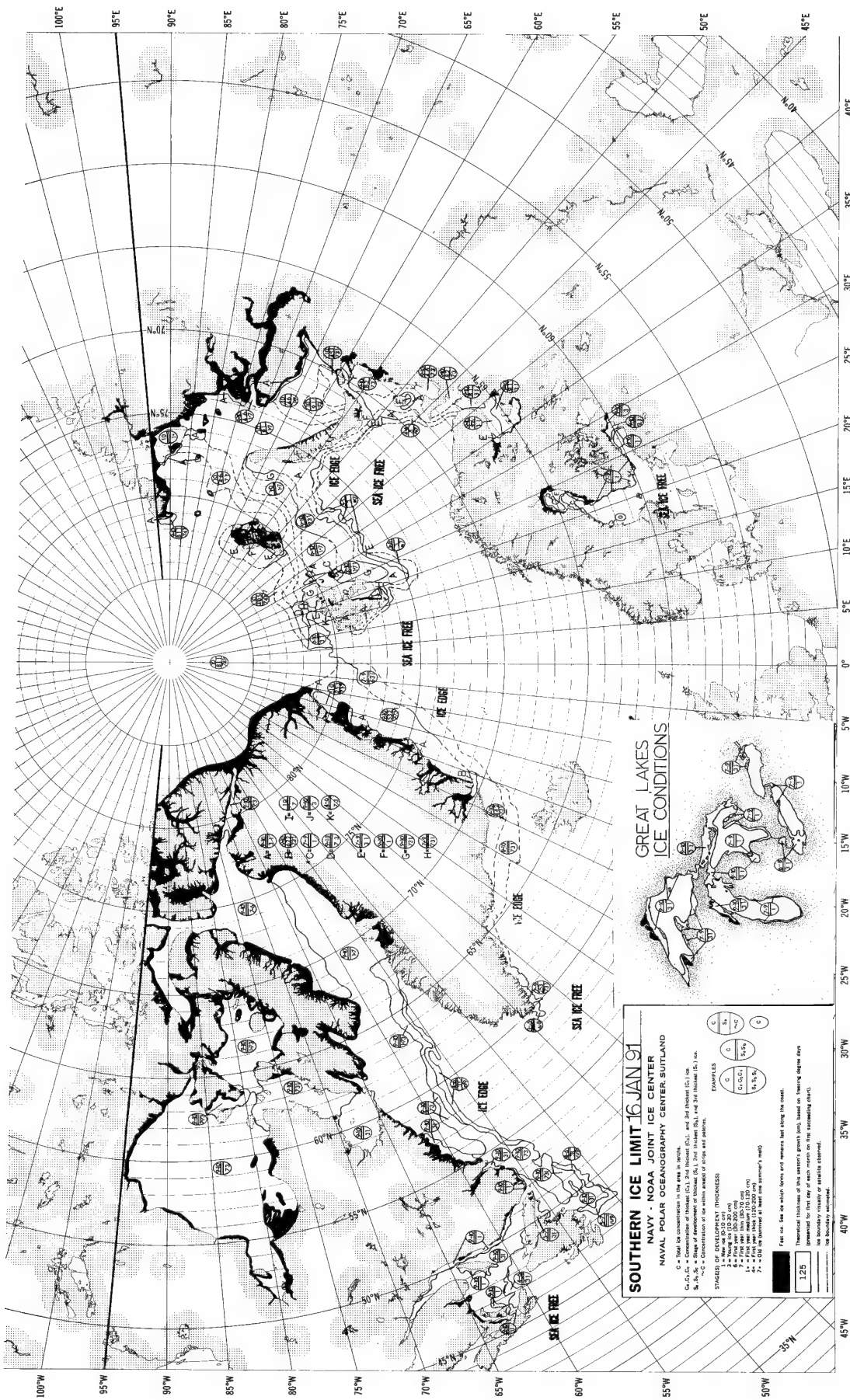
Interpolated thickness of this pattern's report is based on floating degree days.

Interpolated for this day of each month on the ascending chart.

Ice boundary estimated.

GREAT LAKES ICE CONDITIONS





SOUTHERN ICE LIMIT 16 JAN 91
NAVAL POLAR OCEANOGRAPHY CENTER, SUTLAND

C = Total ice concentration in the area in percent.
 G, C, L, S = Concentration of thickened (G), 2nd thickest (C), and 3rd thickest (L, S) ice.
 S, M, V, L = Concentration of thin (S), medium (M), and light (V, L) ice.

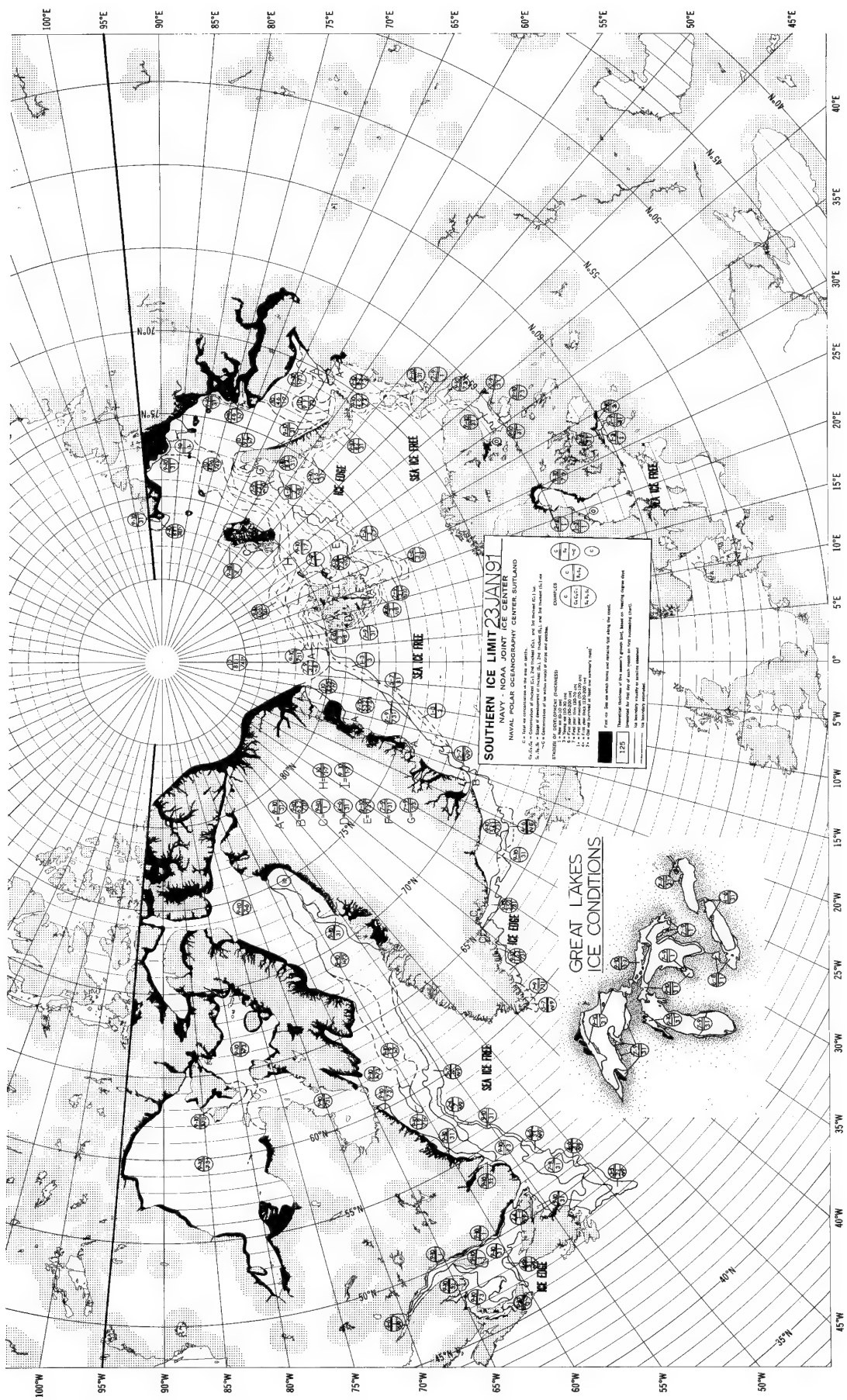
STAGES OF DEVELOPMENT (THICKNESS)

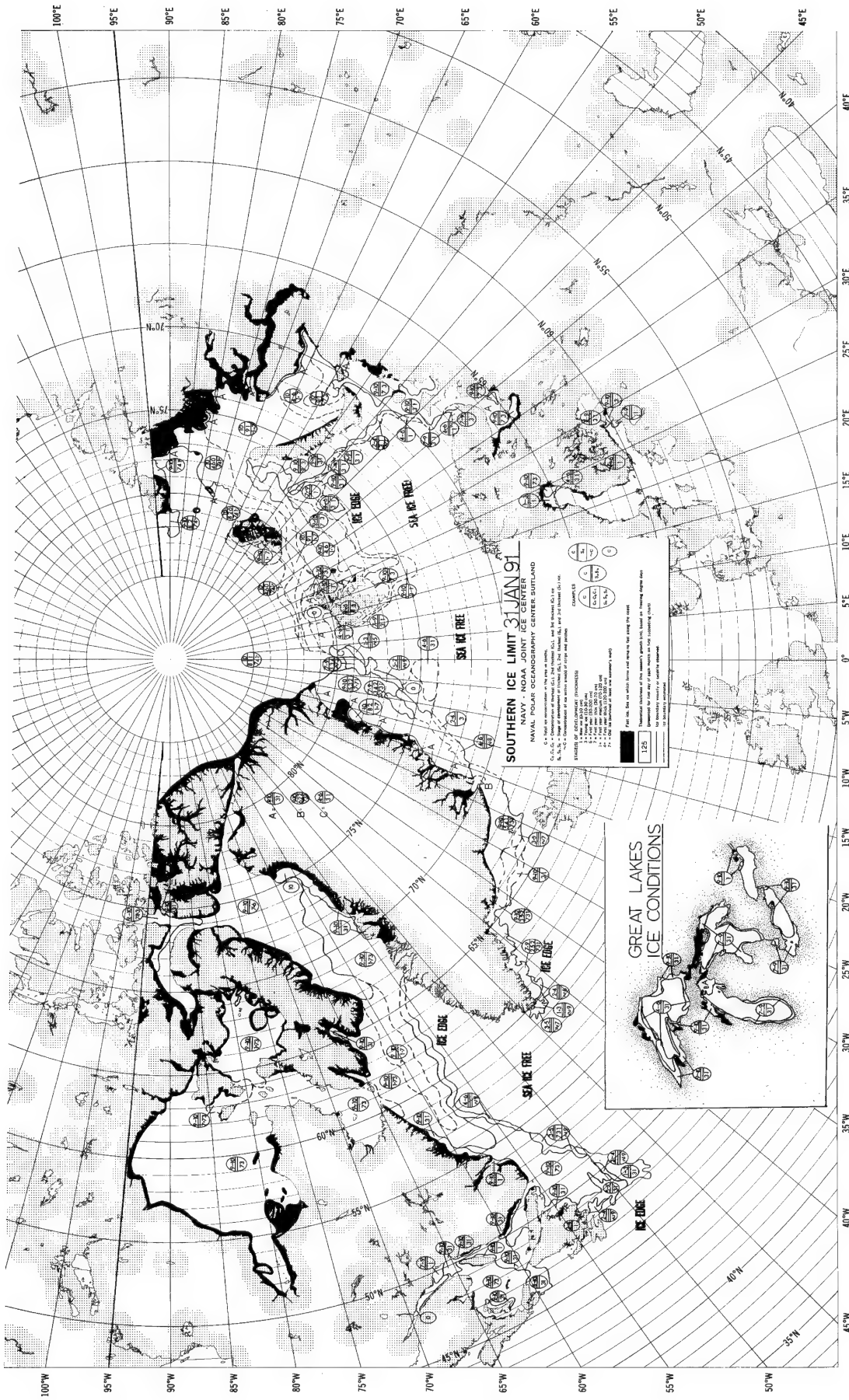
1 = New ice (0-15 cm)
 2 = Thin ice (15-30 cm)
 3 = Medium ice (30-45 cm)
 4 = Thick ice (45-75 cm)
 5 = Very thick ice (75-100 cm)
 6 = Ice on bottom (at least one summer's melt)
 7 = Ice on bottom (at least one summer's melt)

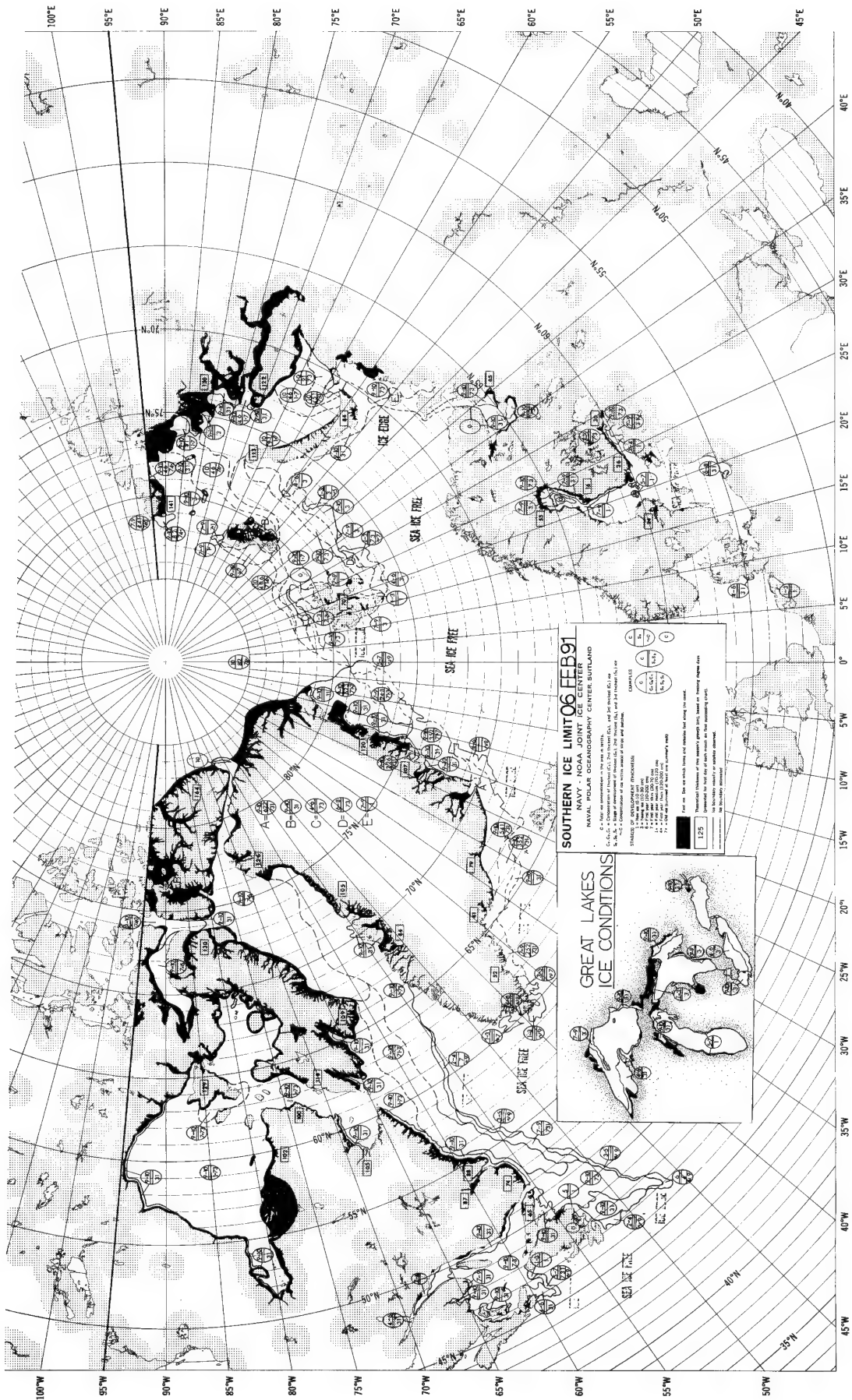
EXAMPLES

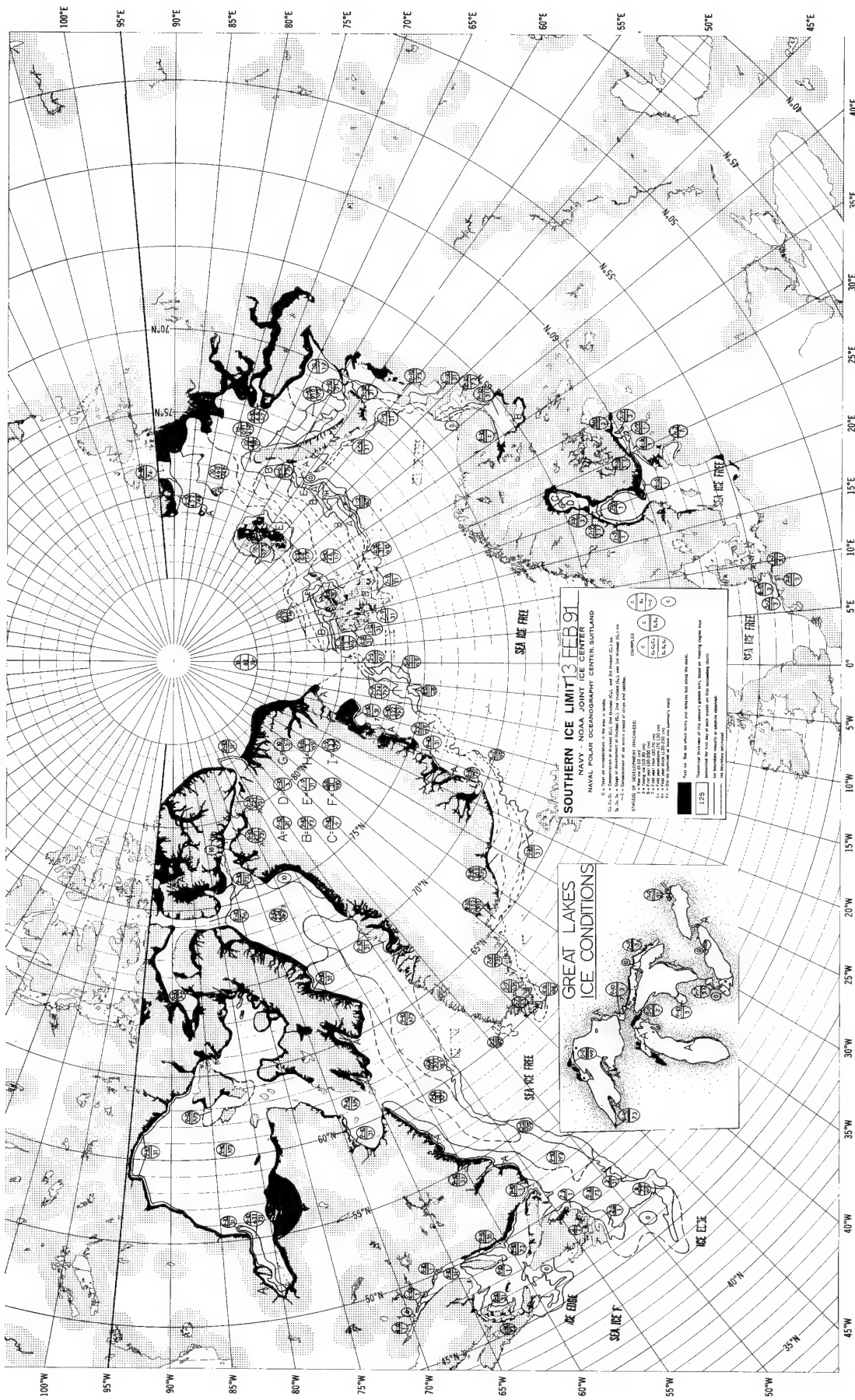
G, C, L, S
 G, C, L, S
 S, M, V, L

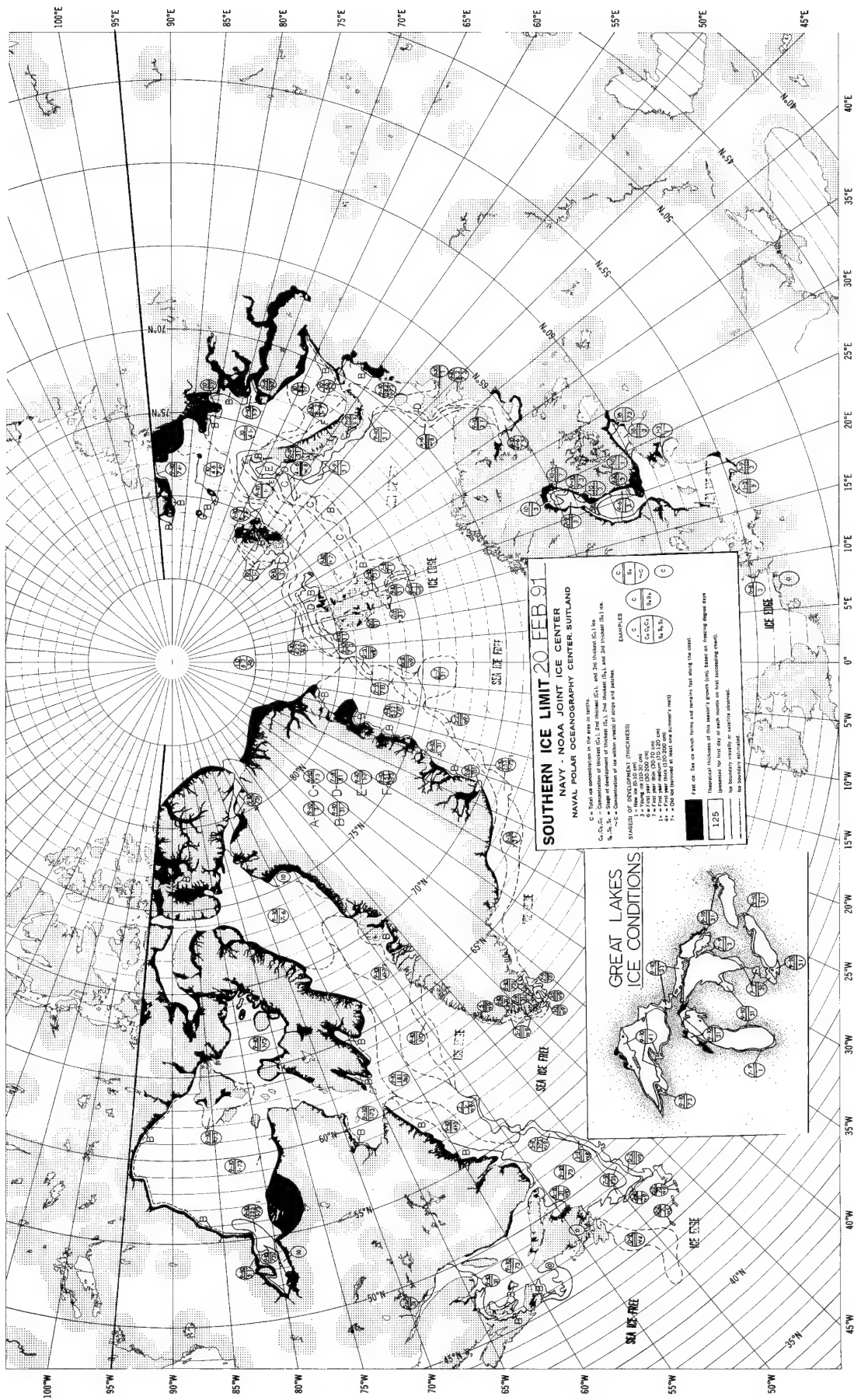
Read ice. See ice which forms and remains last along the coast.
 Thickness of this season's growth limit, based on future degree days.
 Thickness of last year's growth limit, based on future degree days.
 Ice boundary indicated.

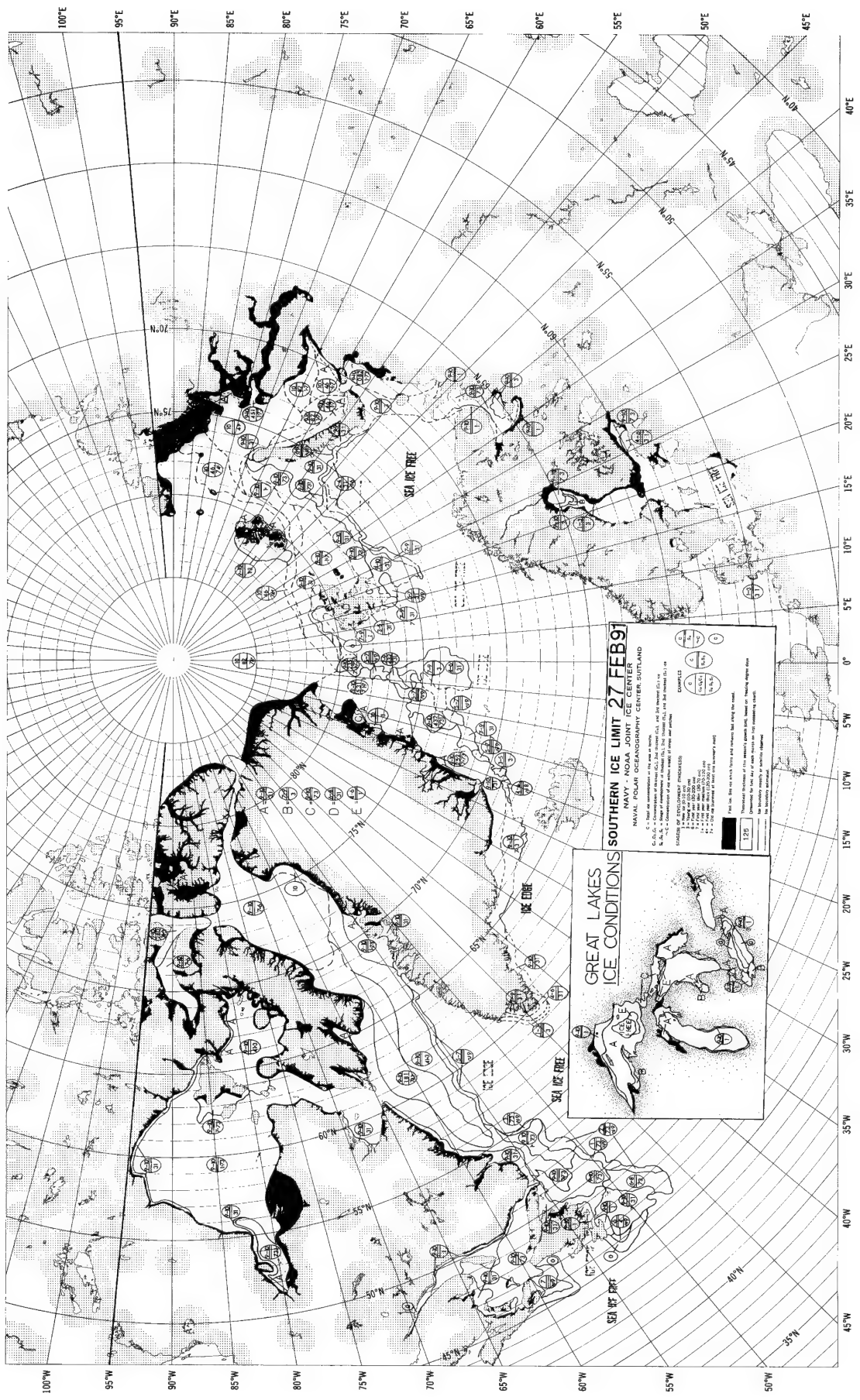


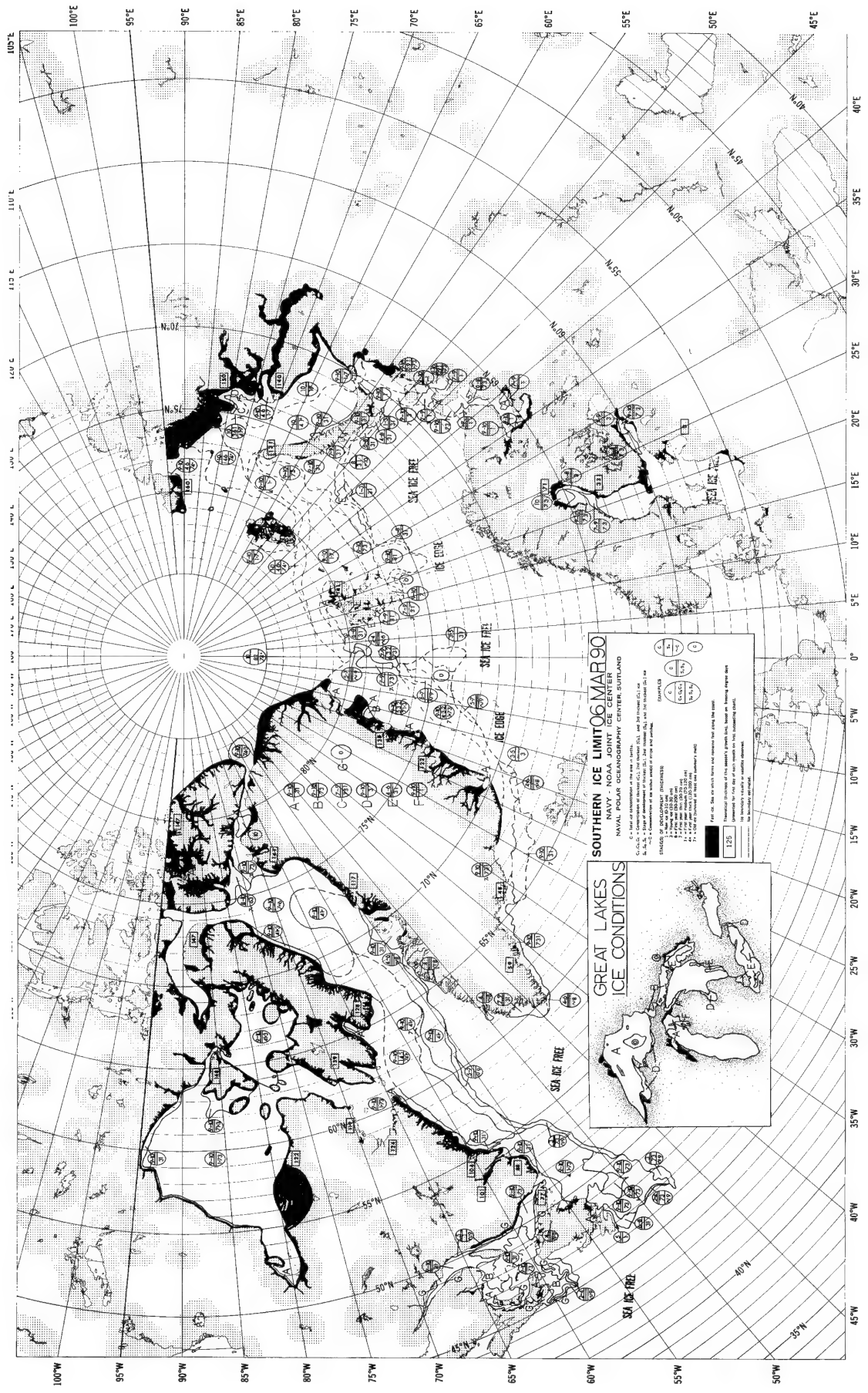






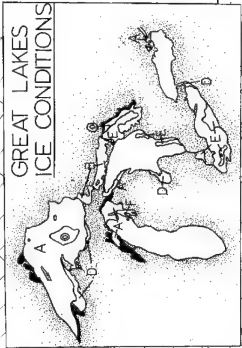


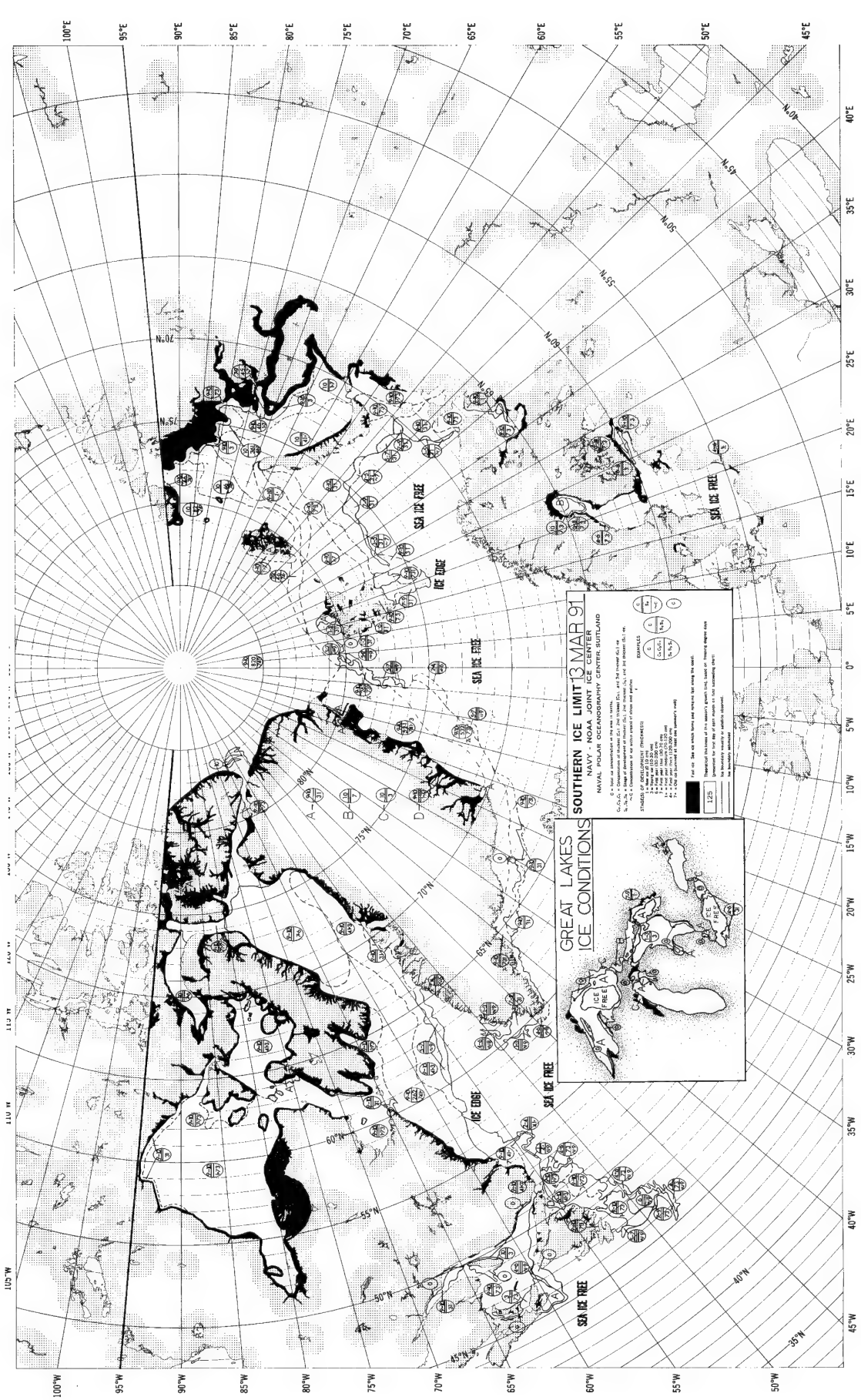




SOUTHERN ICE LIMIT 06 MAR 90
NAVY POLAR OCEANOGRAPHY CENTER SUTLAND

0-100% Ice
1-100% Ice
2-100% Ice
3-100% Ice
4-100% Ice
5-100% Ice
6-100% Ice
7-100% Ice
8-100% Ice
9-100% Ice
10-100% Ice
11-100% Ice
12-100% Ice
13-100% Ice
14-100% Ice
15-100% Ice
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92-100% Ice
93-100% Ice
94-100% Ice
95-100% Ice
96-100% Ice
97-100% Ice
98-100% Ice
99-100% Ice
100-100% Ice





SOUTHERN ICE LIMIT 13 MAR 91
NAVY, NOAA, JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

LEGEND

SHADING

- 1. 125' (3.81m) or less
- 2. 150' (4.57m) or less
- 3. 175' (5.34m) or less
- 4. 200' (6.10m) or less
- 5. 225' (6.86m) or less
- 6. 250' (7.62m) or less
- 7. 275' (8.38m) or less
- 8. 300' (9.14m) or less
- 9. 325' (9.91m) or less
- 10. 350' (10.67m) or less
- 11. 375' (11.43m) or less
- 12. 400' (12.19m) or less
- 13. 425' (12.95m) or less
- 14. 450' (13.71m) or less
- 15. 475' (14.47m) or less
- 16. 500' (15.24m) or less
- 17. 525' (16.00m) or less
- 18. 550' (16.76m) or less
- 19. 575' (17.52m) or less
- 20. 600' (18.29m) or less
- 21. 625' (19.05m) or less
- 22. 650' (19.81m) or less
- 23. 675' (20.57m) or less
- 24. 700' (21.33m) or less
- 25. 725' (22.09m) or less
- 26. 750' (22.86m) or less
- 27. 775' (23.62m) or less
- 28. 800' (24.38m) or less
- 29. 825' (25.14m) or less
- 30. 850' (25.90m) or less
- 31. 875' (26.66m) or less
- 32. 900' (27.43m) or less
- 33. 925' (28.19m) or less
- 34. 950' (28.95m) or less
- 35. 975' (29.71m) or less
- 36. 1000' (30.48m) or less
- 37. 1025' (31.24m) or less
- 38. 1050' (32.00m) or less
- 39. 1075' (32.76m) or less
- 40. 1100' (33.52m) or less
- 41. 1125' (34.28m) or less
- 42. 1150' (35.04m) or less
- 43. 1175' (35.80m) or less
- 44. 1200' (36.57m) or less
- 45. 1225' (37.33m) or less
- 46. 1250' (38.10m) or less
- 47. 1275' (38.86m) or less
- 48. 1300' (39.62m) or less
- 49. 1325' (40.38m) or less
- 50. 1350' (41.14m) or less
- 51. 1375' (41.90m) or less
- 52. 1400' (42.67m) or less
- 53. 1425' (43.43m) or less
- 54. 1450' (44.19m) or less
- 55. 1475' (44.95m) or less
- 56. 1500' (45.71m) or less
- 57. 1525' (46.47m) or less
- 58. 1550' (47.23m) or less
- 59. 1575' (47.99m) or less
- 60. 1600' (48.75m) or less
- 61. 1625' (49.51m) or less
- 62. 1650' (50.27m) or less
- 63. 1675' (51.03m) or less
- 64. 1700' (51.79m) or less
- 65. 1725' (52.55m) or less
- 66. 1750' (53.31m) or less
- 67. 1775' (54.07m) or less
- 68. 1800' (54.83m) or less
- 69. 1825' (55.59m) or less
- 70. 1850' (56.35m) or less
- 71. 1875' (57.11m) or less
- 72. 1900' (57.87m) or less
- 73. 1925' (58.63m) or less
- 74. 1950' (59.39m) or less
- 75. 1975' (60.15m) or less
- 76. 2000' (60.91m) or less
- 77. 2025' (61.67m) or less
- 78. 2050' (62.43m) or less
- 79. 2075' (63.19m) or less
- 80. 2100' (63.95m) or less
- 81. 2125' (64.71m) or less
- 82. 2150' (65.47m) or less
- 83. 2175' (66.23m) or less
- 84. 2200' (66.99m) or less
- 85. 2225' (67.75m) or less
- 86. 2250' (68.51m) or less
- 87. 2275' (69.27m) or less
- 88. 2300' (70.03m) or less
- 89. 2325' (70.79m) or less
- 90. 2350' (71.55m) or less
- 91. 2375' (72.31m) or less
- 92. 2400' (73.07m) or less
- 93. 2425' (73.83m) or less
- 94. 2450' (74.59m) or less
- 95. 2475' (75.35m) or less
- 96. 2500' (76.11m) or less
- 97. 2525' (76.87m) or less
- 98. 2550' (77.63m) or less
- 99. 2575' (78.39m) or less
- 100. 2600' (79.15m) or less
- 101. 2625' (79.91m) or less
- 102. 2650' (80.67m) or less
- 103. 2675' (81.43m) or less
- 104. 2700' (82.19m) or less
- 105. 2725' (82.95m) or less
- 106. 2750' (83.71m) or less
- 107. 2775' (84.47m) or less
- 108. 2800' (85.23m) or less
- 109. 2825' (85.99m) or less
- 110. 2850' (86.75m) or less
- 111. 2875' (87.51m) or less
- 112. 2900' (88.27m) or less
- 113. 2925' (89.03m) or less
- 114. 2950' (89.79m) or less
- 115. 2975' (90.55m) or less
- 116. 3000' (91.31m) or less
- 117. 3025' (92.07m) or less
- 118. 3050' (92.83m) or less
- 119. 3075' (93.59m) or less
- 120. 3100' (94.35m) or less
- 121. 3125' (95.11m) or less
- 122. 3150' (95.87m) or less
- 123. 3175' (96.63m) or less
- 124. 3200' (97.39m) or less
- 125. 3225' (98.15m) or less
- 126. 3250' (98.91m) or less
- 127. 3275' (99.67m) or less
- 128. 3300' (100.43m) or less
- 129. 3325' (101.19m) or less
- 130. 3350' (101.95m) or less
- 131. 3375' (102.71m) or less
- 132. 3400' (103.47m) or less
- 133. 3425' (104.23m) or less
- 134. 3450' (104.99m) or less
- 135. 3475' (105.75m) or less
- 136. 3500' (106.51m) or less
- 137. 3525' (107.27m) or less
- 138. 3550' (108.03m) or less
- 139. 3575' (108.79m) or less
- 140. 3600' (109.55m) or less
- 141. 3625' (110.31m) or less
- 142. 3650' (111.07m) or less
- 143. 3675' (111.83m) or less
- 144. 3700' (112.59m) or less
- 145. 3725' (113.35m) or less
- 146. 3750' (114.11m) or less
- 147. 3775' (114.87m) or less
- 148. 3800' (115.63m) or less
- 149. 3825' (116.39m) or less
- 150. 3850' (117.15m) or less
- 151. 3875' (117.91m) or less
- 152. 3900' (118.67m) or less
- 153. 3925' (119.43m) or less
- 154. 3950' (120.19m) or less
- 155. 3975' (120.95m) or less
- 156. 4000' (121.71m) or less
- 157. 4025' (122.47m) or less
- 158. 4050' (123.23m) or less
- 159. 4075' (123.99m) or less
- 160. 4100' (124.75m) or less
- 161. 4125' (125.51m) or less
- 162. 4150' (126.27m) or less
- 163. 4175' (127.03m) or less
- 164. 4200' (127.79m) or less
- 165. 4225' (128.55m) or less
- 166. 4250' (129.31m) or less
- 167. 4275' (130.07m) or less
- 168. 4300' (130.83m) or less
- 169. 4325' (131.59m) or less
- 170. 4350' (132.35m) or less
- 171. 4375' (133.11m) or less
- 172. 4400' (133.87m) or less
- 173. 4425' (134.63m) or less
- 174. 4450' (135.39m) or less
- 175. 4475' (136.15m) or less
- 176. 4500' (136.91m) or less
- 177. 4525' (137.67m) or less
- 178. 4550' (138.43m) or less
- 179. 4575' (139.19m) or less
- 180. 4600' (140.95m) or less
- 181. 4625' (141.71m) or less
- 182. 4650' (142.47m) or less
- 183. 4675' (143.23m) or less
- 184. 4700' (143.99m) or less
- 185. 4725' (144.75m) or less
- 186. 4750' (145.51m) or less
- 187. 4775' (146.27m) or less
- 188. 4800' (147.03m) or less
- 189. 4825' (147.79m) or less
- 190. 4850' (148.55m) or less
- 191. 4875' (149.31m) or less
- 192. 4900' (150.07m) or less
- 193. 4925' (150.83m) or less
- 194. 4950' (151.59m) or less
- 195. 4975' (152.35m) or less
- 196. 5000' (153.11m) or less
- 197. 5025' (153.87m) or less
- 198. 5050' (154.63m) or less
- 199. 5075' (155.39m) or less
- 200. 5100' (156.15m) or less
- 201. 5125' (156.91m) or less
- 202. 5150' (157.67m) or less
- 203. 5175' (158.43m) or less
- 204. 5200' (159.19m) or less
- 205. 5225' (159.95m) or less
- 206. 5250' (160.71m) or less
- 207. 5275' (161.47m) or less
- 208. 5300' (162.23m) or less
- 209. 5325' (162.99m) or less
- 210. 5350' (163.75m) or less
- 211. 5375' (164.51m) or less
- 212. 5400' (165.27m) or less
- 213. 5425' (166.03m) or less
- 214. 5450' (166.79m) or less
- 215. 5475' (167.55m) or less
- 216. 5500' (168.31m) or less
- 217. 5525' (169.07m) or less
- 218. 5550' (169.83m) or less
- 219. 5575' (170.59m) or less
- 220. 5600' (171.35m) or less
- 221. 5625' (172.11m) or less
- 222. 5650' (172.87m) or less
- 223. 5675' (173.63m) or less
- 224. 5700' (174.39m) or less
- 225. 5725' (175.15m) or less
- 226. 5750' (175.91m) or less
- 227. 5775' (176.67m) or less
- 228. 5800' (177.43m) or less
- 229. 5825' (178.19m) or less
- 230. 5850' (178.95m) or less
- 231. 5875' (179.71m) or less
- 232. 5900' (180.47m) or less
- 233. 5925' (181.23m) or less
- 234. 5950' (181.99m) or less
- 235. 5975' (182.75m) or less
- 236. 6000' (183.51m) or less
- 237. 6025' (184.27m) or less
- 238. 6050' (185.03m) or less
- 239. 6075' (185.79m) or less
- 240. 6100' (186.55m) or less
- 241. 6125' (187.31m) or less
- 242. 6150' (188.07m) or less
- 243. 6175' (188.83m) or less
- 244. 6200' (189.59m) or less
- 245. 6225' (190.35m) or less
- 246. 6250' (191.11m) or less
- 247. 6275' (191.87m) or less
- 248. 6300' (192.63m) or less
- 249. 6325' (193.39m) or less
- 250. 6350' (194.15m) or less
- 251. 6375' (194.91m) or less
- 252. 6400' (195.67m) or less
- 253. 6425' (196.43m) or less
- 254. 6450' (197.19m) or less
- 255. 6475' (197.95m) or less
- 256. 6500' (198.71m) or less
- 257. 6525' (199.47m) or less
- 258. 6550' (200.23m) or less
- 259. 6575' (200.99m) or less
- 260. 6600' (201.75m) or less
- 261. 6625' (202.51m) or less
- 262. 6650' (203.27m) or less
- 263. 6675' (204.03m) or less
- 264. 6700' (204.79m) or less
- 265. 6725' (205.55m) or less
- 266. 6750' (206.31m) or less
- 267. 6775' (207.07m) or less
- 268. 6800' (207.83m) or less
- 269. 6825' (208.59m) or less
- 270. 6850' (209.35m) or less
- 271. 6875' (210.11m) or less
- 272. 6900' (210.87m) or less
- 273. 6925' (211.63m) or less
- 274. 6950' (212.39m) or less
- 275. 6975' (213.15m) or less
- 276. 7000' (213.91m) or less
- 277. 7025' (214.67m) or less
- 278. 7050' (215.43m) or less
- 279. 7075' (216.19m) or less
- 280. 7100' (216.95m) or less
- 281. 7125' (217.71m) or less
- 282. 7150' (218.47m) or less
- 283. 7175' (219.23m) or less
- 284. 7200' (220.99m) or less
- 285. 7225' (221.75m) or less
- 286. 7250' (222.51m) or less
- 287. 7275' (223.27m) or less
- 288. 7300' (224.03m) or less
- 289. 7325' (224.79m) or less
- 290. 7350' (225.55m) or less
- 291. 7375' (226.31m) or less
- 292. 7400' (227.07m) or less
- 293. 7425' (227.83m) or less
- 294. 7450' (228.59m) or less
- 295. 7475' (229.35m) or less
- 296. 7500' (230.11m) or less
- 297. 7525' (230.87m) or less
- 298. 7550' (231.63m) or less
- 299. 7575' (232.39m) or less
- 300. 7600' (233.15m) or less
- 301. 7625' (233.91m) or less
- 302. 7650' (234.67m) or less
- 303. 7675' (235.43m) or less
- 304. 7700' (236.19m) or less
- 305. 7725' (236.95m) or less
- 306. 7750' (237.71m) or less
- 307. 7775' (238.47m) or less
- 308. 7800' (239.23m) or less
- 309. 7825' (240.99m) or less
- 310. 7850' (241.75m) or less
- 311. 7875' (242.51m) or less
- 312. 7900' (243.27m) or less
- 313. 7925' (244.03m) or less
- 314. 7950' (244.79m) or less
- 315. 7975' (245.55m) or less
- 316. 8000' (246.31m) or less
- 317. 8025' (247.07m) or less
- 318. 8050' (247.83m) or less
- 319. 8075' (248.59m) or less
- 320. 8100' (249.35m) or less
- 321. 8125' (250.11m) or less
- 322. 8150' (250.87m) or less
- 323. 8175' (251.63m) or less
- 324. 8200' (252.39m) or less
- 325. 8225' (253.15m) or less
- 326. 8250' (253.91m) or less
- 327. 8275' (254.67m) or less
- 328. 8300' (255.43m) or less
- 329. 8325' (256.19m) or less
- 330. 8350' (256.95m) or less
- 331. 8375' (257.71m) or less
- 332. 8400' (258.47m) or less
- 333. 8425' (259.23m) or less
- 334. 8450' (260.99m) or less
- 335. 8475' (261.75m) or less
- 336. 8500' (262.51m) or less
- 337. 8525' (263.27m) or less
- 338. 8550' (264.03m) or less
- 339. 8575' (264.79m) or less
- 340. 8600' (265.55m) or less
- 341. 8625' (266.31m) or less
- 342. 8650' (267.07m) or less
- 343. 8675' (267.83m) or less
- 344. 8700' (268.59m) or less
- 345. 8725' (269.35m) or less
- 346. 8750' (270.11m) or less
- 347. 8775' (270.87m) or less
- 348. 8800' (271.63m) or less
- 349. 8825' (272.39m) or less
- 350. 8850' (273.15m) or less
- 351. 8875' (273.91m) or less
- 352. 8900' (274.67m) or less
- 353. 8925' (275.43m) or less
- 354. 8950' (276.19m) or less
- 355. 8975' (276.95m) or less
- 356. 9000' (277.71m) or less
- 357. 9025' (278.47m) or less
- 358. 9050' (279.23m) or less
- 359. 9075' (280.99m) or less
- 360. 9100' (281.75m) or less
- 361. 9125' (282.51m) or less
- 362. 9150' (283.27m) or less
- 363. 9175' (284.03m) or less
- 364. 9200' (284.79m) or less
- 365. 9225' (285.55m) or less
- 366. 9250' (286.31m) or less
- 367. 9275' (287.07m) or less
- 368. 9300' (287.83m) or less
- 369. 9325' (288.59m) or less
- 370. 9350' (289.35m) or less
- 371. 9375' (290.11m) or less
- 372. 9400' (290.87m) or less
- 373. 9425' (291.63m) or less
- 374. 9450' (292.39m) or less
- 375. 9475' (293.15m) or less
- 376. 9500' (293.91m) or less
- 377. 9525' (294.67m) or less
- 378. 9550' (295.43m) or less
- 379. 9575' (296.19m) or less
- 380. 9600' (296.95m) or less
- 381. 9625' (297.71m) or less
- 382. 9650' (298.47m) or less
- 383. 9675' (299.23m) or less
- 384. 9700' (299.99m) or less
- 385. 9725' (300.75m) or less
- 386. 9750' (301.51m) or less
- 387. 9775' (302.27m) or less
- 388. 9800' (303.03m) or less
- 389. 9825' (303.79m) or less
- 390. 9850' (304.55m) or less
- 391. 9875' (305.31m) or less
- 392. 9900' (306.07m) or less
- 393. 9925' (306.83m) or less
- 394. 9950' (307.59m) or less
- 395. 9975' (308.35m) or less
- 396. 10000' (309.11m) or less

EXAMPLES

1. 125' (3.81m) or less

2. 150' (4.57m) or less

3. 175' (5.34m) or less

4. 200' (6.10m) or less

5. 225' (6.86m) or less

6. 250' (7.62m) or less

7. 275' (8.38m) or less

8. 300' (9.14m) or less

9. 325' (9.91m) or less

10. 350' (10.67m) or less

11. 375' (11.43m) or less

12. 400' (12.19m) or less

13. 425' (12.95m) or less

14. 450' (13.71m) or less

15. 475' (14.47m) or less

16. 500' (15.24m) or less

17. 525' (16.00m) or less

18. 550' (16.76m) or less

19. 575' (17.52m) or less

20. 600' (18.29m) or less

21. 625' (19.05m) or less

22. 650' (19.81m) or less

23. 675' (20.57m) or less

24. 700' (21.33m) or less

25. 725' (22.09m) or less

26. 750' (22.86m) or less

27. 775' (23.62m) or less

28. 800' (24.38m) or less

29. 825' (25.14m) or less

30. 850' (25.90m) or less

31. 875' (26.66m) or less

32. 900' (27.43m) or less

33. 925' (28.19m) or less

34. 950' (28.95m) or less

35. 975' (29.71m) or less

36. 1000' (30.48m) or less

37. 1025' (31.24m) or less

38. 1050' (32.00m) or less

39. 1075' (32.76m) or less

40. 1100' (33.52m) or less

41. 1125' (34.28m) or less

42. 1150' (35.04m) or less

43. 1175' (35.80m) or less

44. 1200' (36.57m) or less

45. 1225' (37.33m) or less

46. 1250' (38.10m) or less

47. 1275' (38.86m) or less

48. 1300' (39.62m) or less

49. 1325' (40.38m) or less

50. 1350' (41.14m) or less

51. 1375' (41.90m) or less

52. 1400' (42.67m) or less

53. 1425' (43.43m) or less

54. 1450' (44.19m) or less

55. 1475' (44.95m) or less

56. 1500' (45.71m) or less

57. 1525' (46.47m) or less

58. 1550' (47.23m) or less

59. 1575' (47.99m) or less

60. 1600' (48.75m) or less

61. 1625' (49.51m) or less

62. 1650' (50.27m) or less

63. 1675' (51.03m) or less

64. 1700' (51.79m) or less

65. 1725' (52.55m) or less

66. 1750' (53.31m) or less

67. 1775' (54.07m) or less

68. 1800' (54.83m) or less

69. 1825' (55.59m) or less

70. 1850' (56.35m) or less

71. 1875' (57.11m) or less

72. 1900' (57.87m) or less

73. 1925' (58.63m) or less

74. 1950' (59.39m) or less

75. 1975' (60.15m) or less

76. 2000' (60.91m) or less

77. 2025' (61.67m) or less

78. 2050' (62.43m) or less

79. 2075' (63.19m) or less

80. 2100' (63.95m) or less

81. 2125' (64.71m) or less

82. 2150' (65.47m) or less

83. 2175' (66.23m) or less

84. 2200' (66.99m) or less

85. 2225' (67.75m) or less

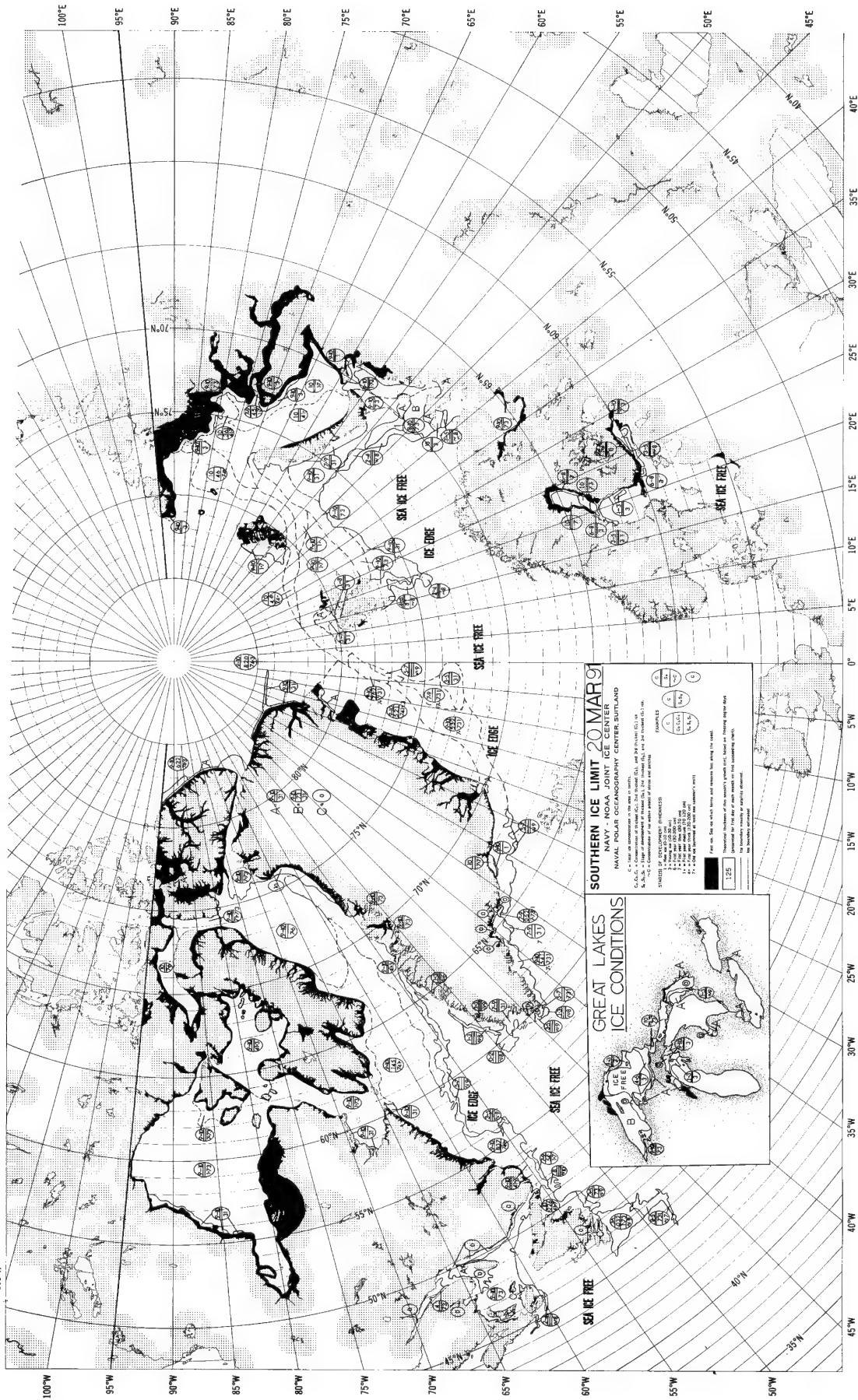
86. 2250' (68.51m) or less

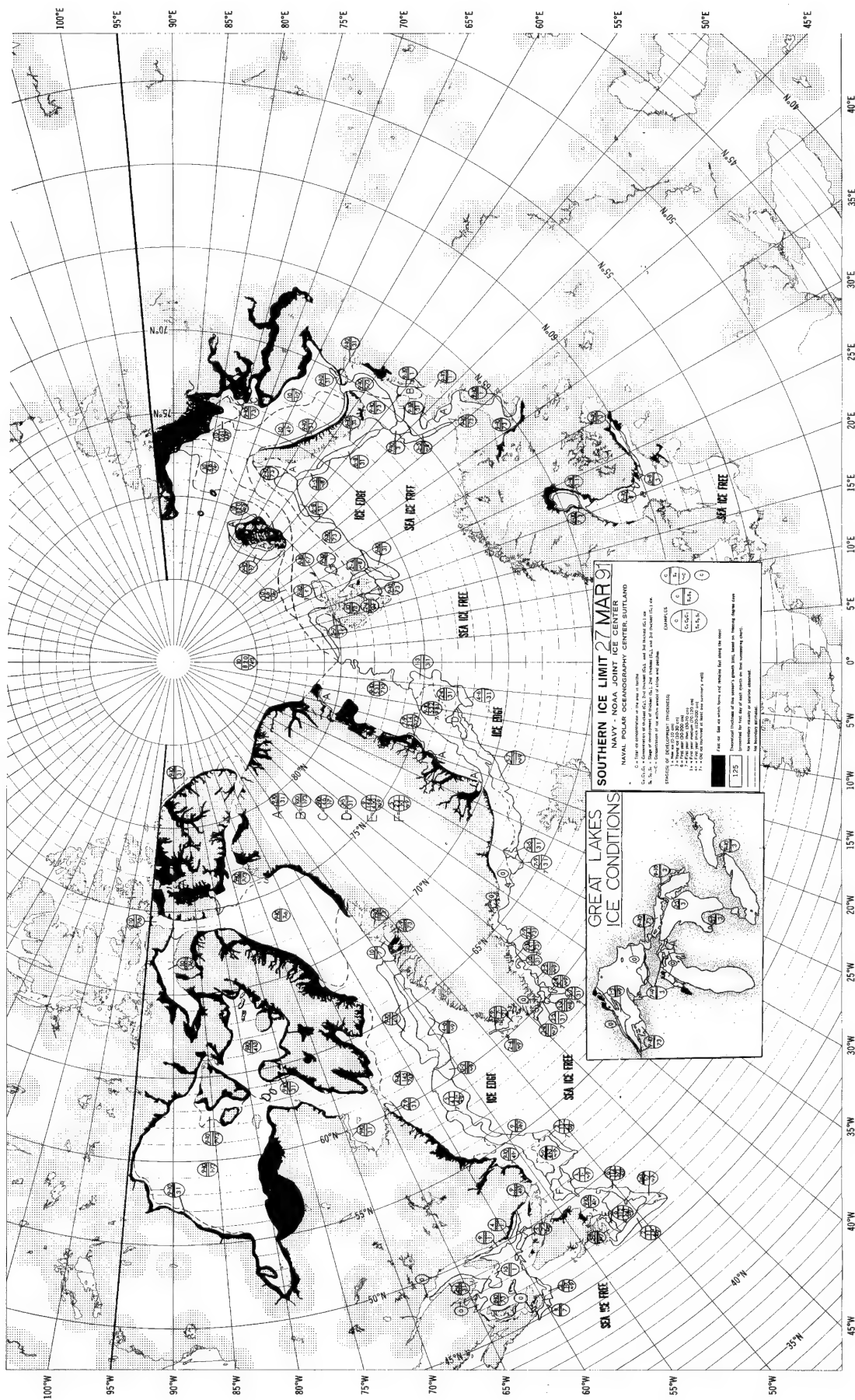
87. 2275' (69.27m) or less

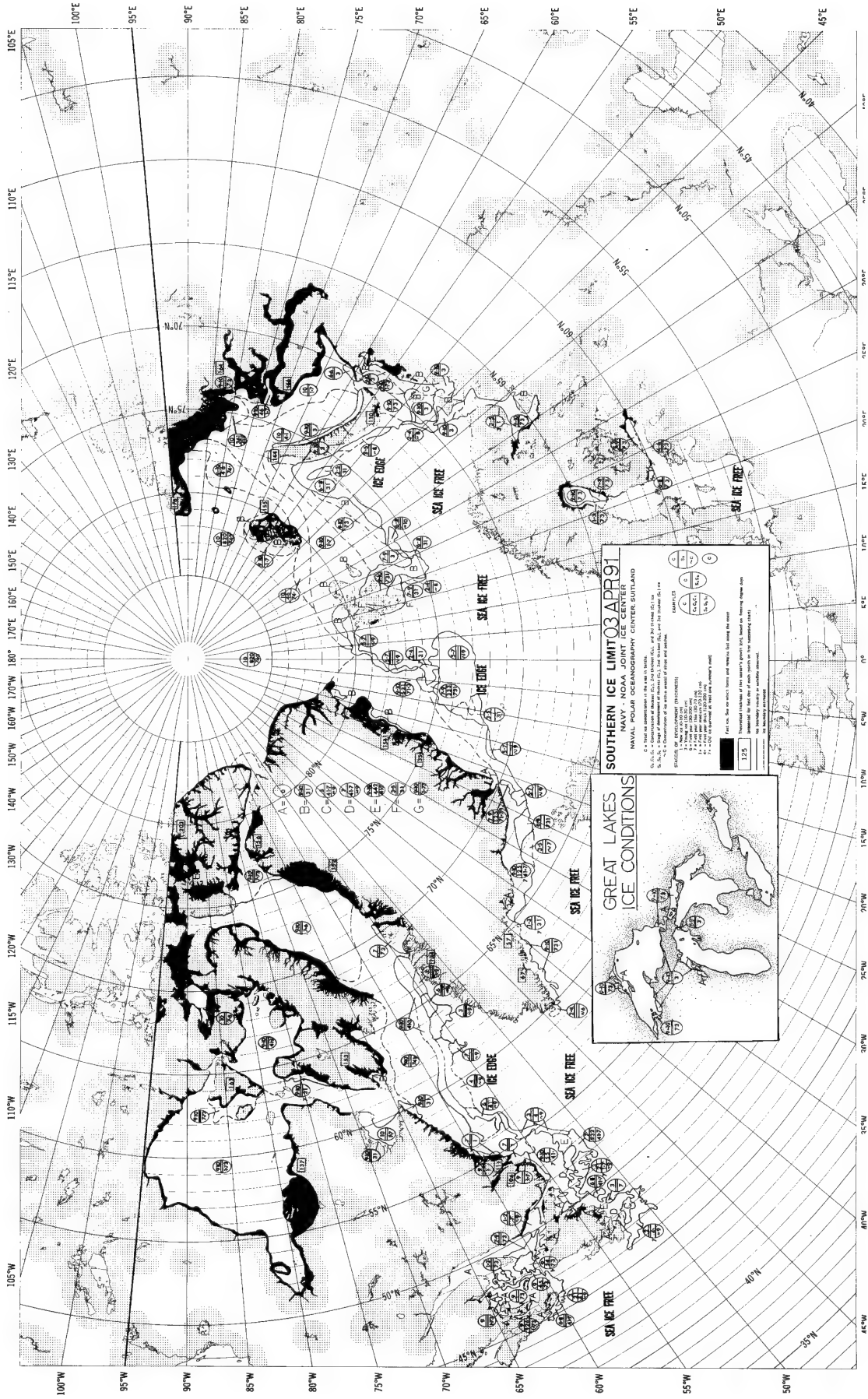
88. 2300' (70.03m) or less

89. 2325' (70.79m) or less

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SOUTHERN ICE LIMIT 03 APR 91
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. This chart shows the southern limit of sea ice in the Arctic Ocean as of 03 APR 91. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

2. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

3. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

4. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

5. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

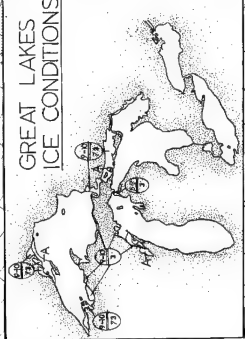
6. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

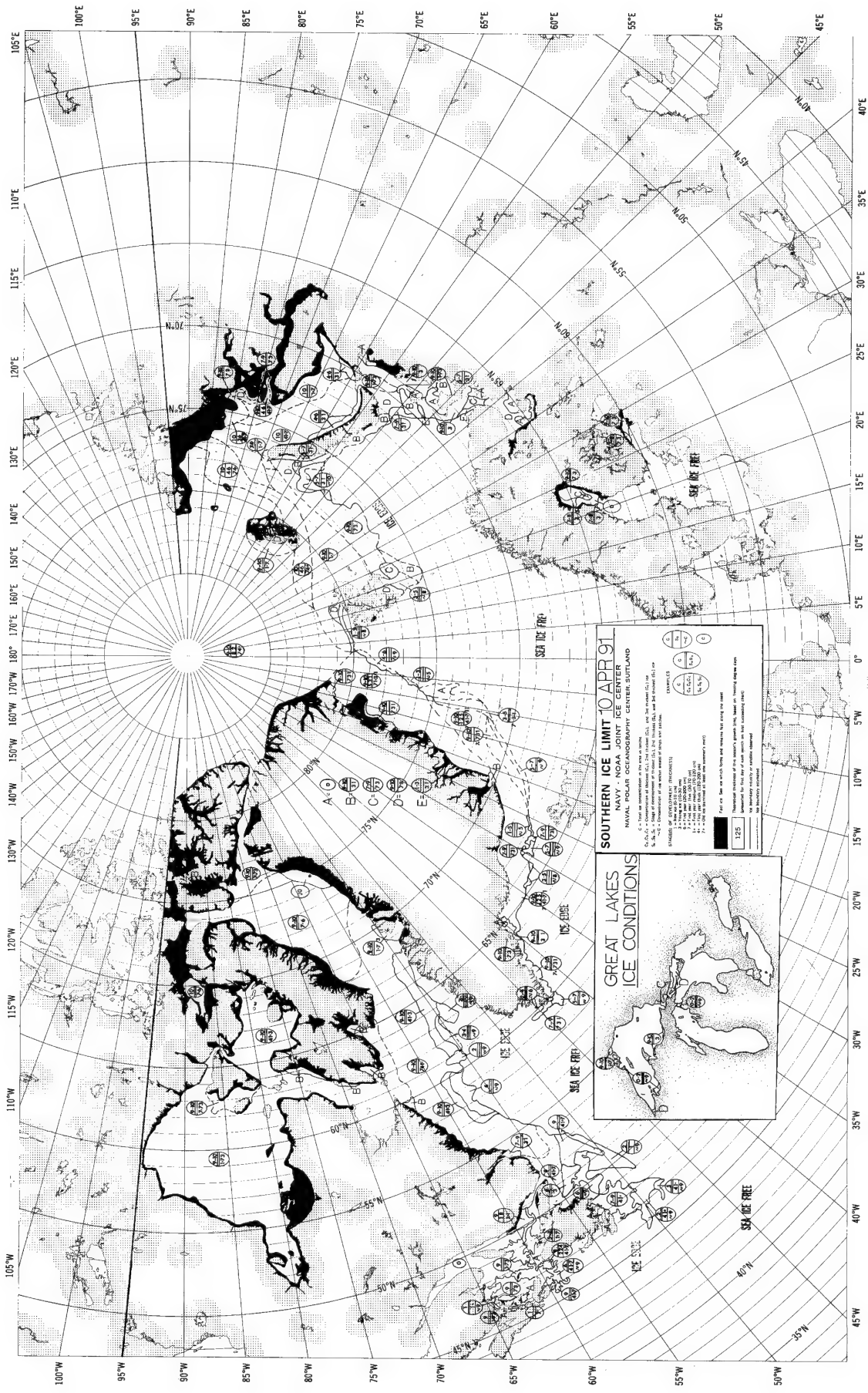
7. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

8. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

9. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

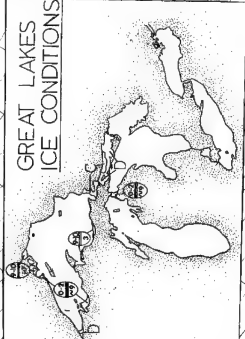
10. The limit is defined by the 100% ice concentration contour. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded.

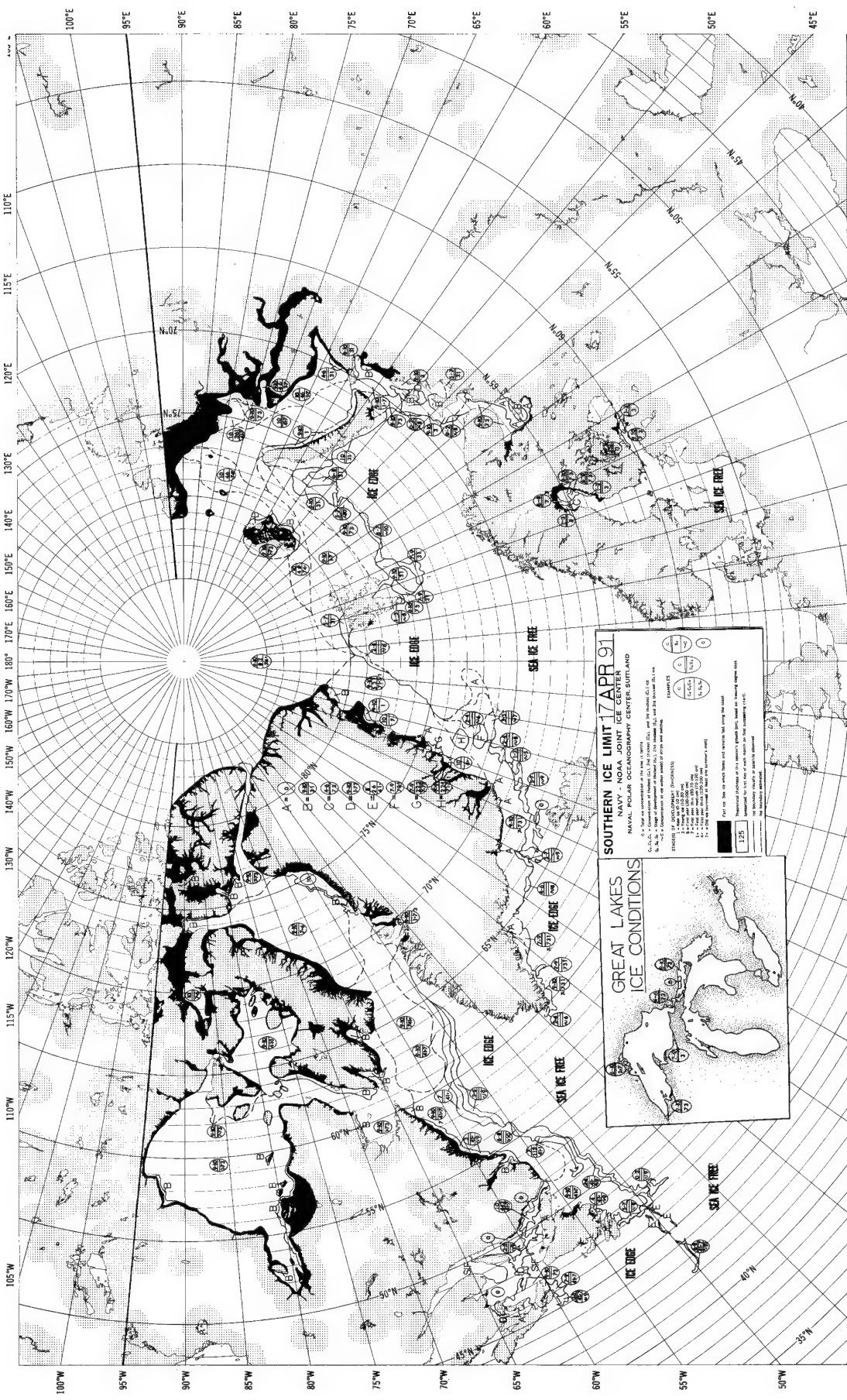




SOUTHERN ICE LIMIT 10 APR 91
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER BUTLAND

1. Year of observation in the year of issue
2. Date of observation in the year of issue
3. Latitude of observation in the year of issue
4. Longitude of observation in the year of issue
5. Thickness of ice in meters
6. Direction of ice movement in the year of issue
7. Direction of ice drift in the year of issue
8. Direction of ice drift in the year of issue
9. Direction of ice drift in the year of issue
10. Direction of ice drift in the year of issue
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97. Direction of ice drift in the year of issue
98. Direction of ice drift in the year of issue
99. Direction of ice drift in the year of issue
100. Direction of ice drift in the year of issue





SOUTHERN ICE LIMIT 17 APR 91
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. This map is a representation of the ice limit as of 17 APR 91, 0000Z. It is based on the latest available data from the Navy and NOAA.

2. The ice limit is defined as the boundary between the ice-covered area and the sea ice free area.

3. The sea ice free area is defined as the area where the ice thickness is less than 100 feet.

4. The ice-covered area is defined as the area where the ice thickness is greater than 100 feet.

5. The ice limit is shown as a solid line, and the sea ice free area is shown as a shaded area.

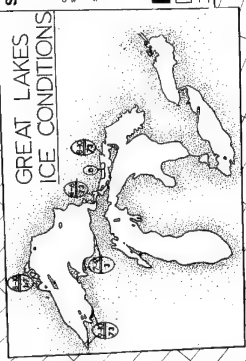
6. The ice-covered area is shown as a hatched area.

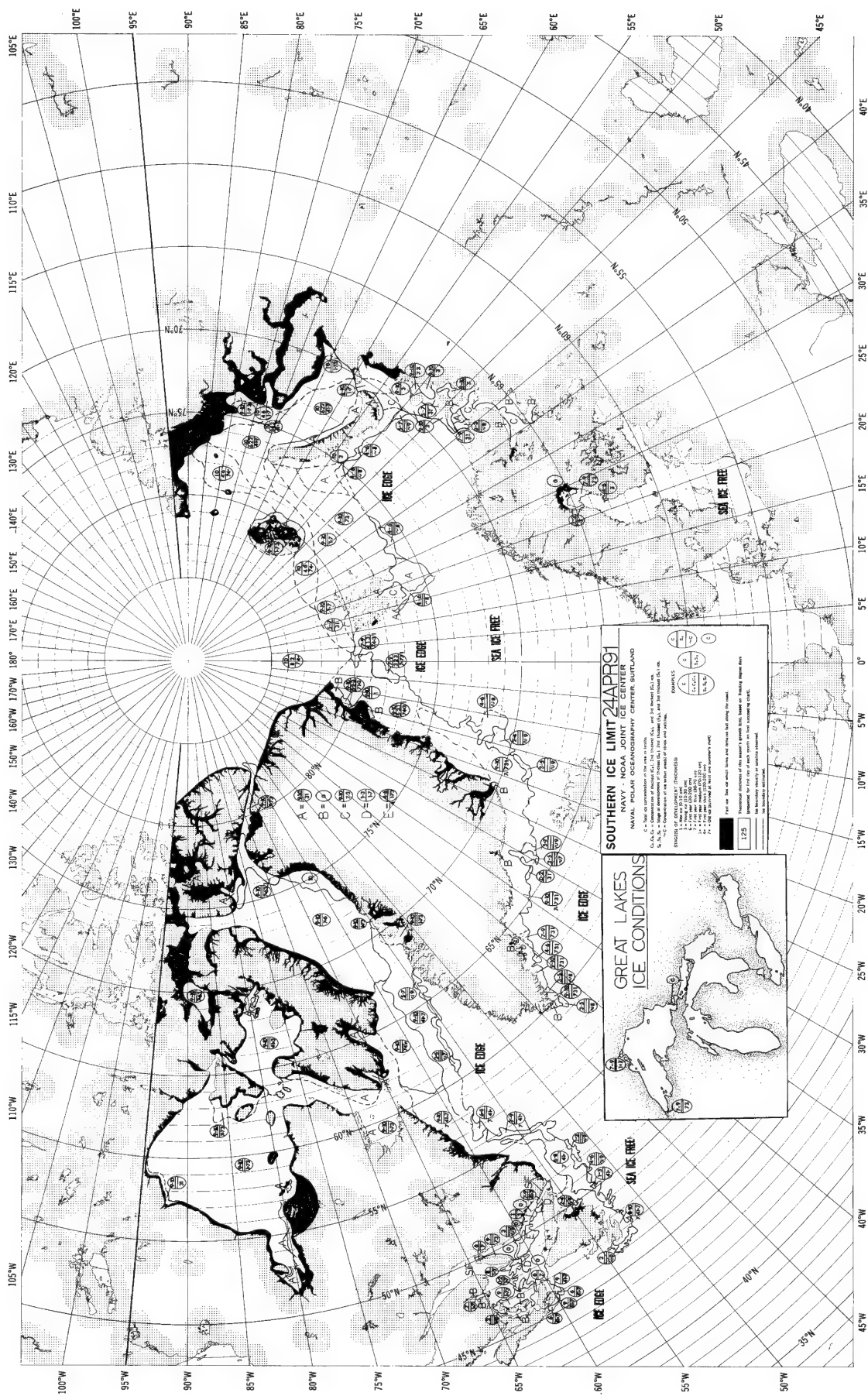
7. The ice limit is shown as a solid line, and the sea ice free area is shown as a shaded area.

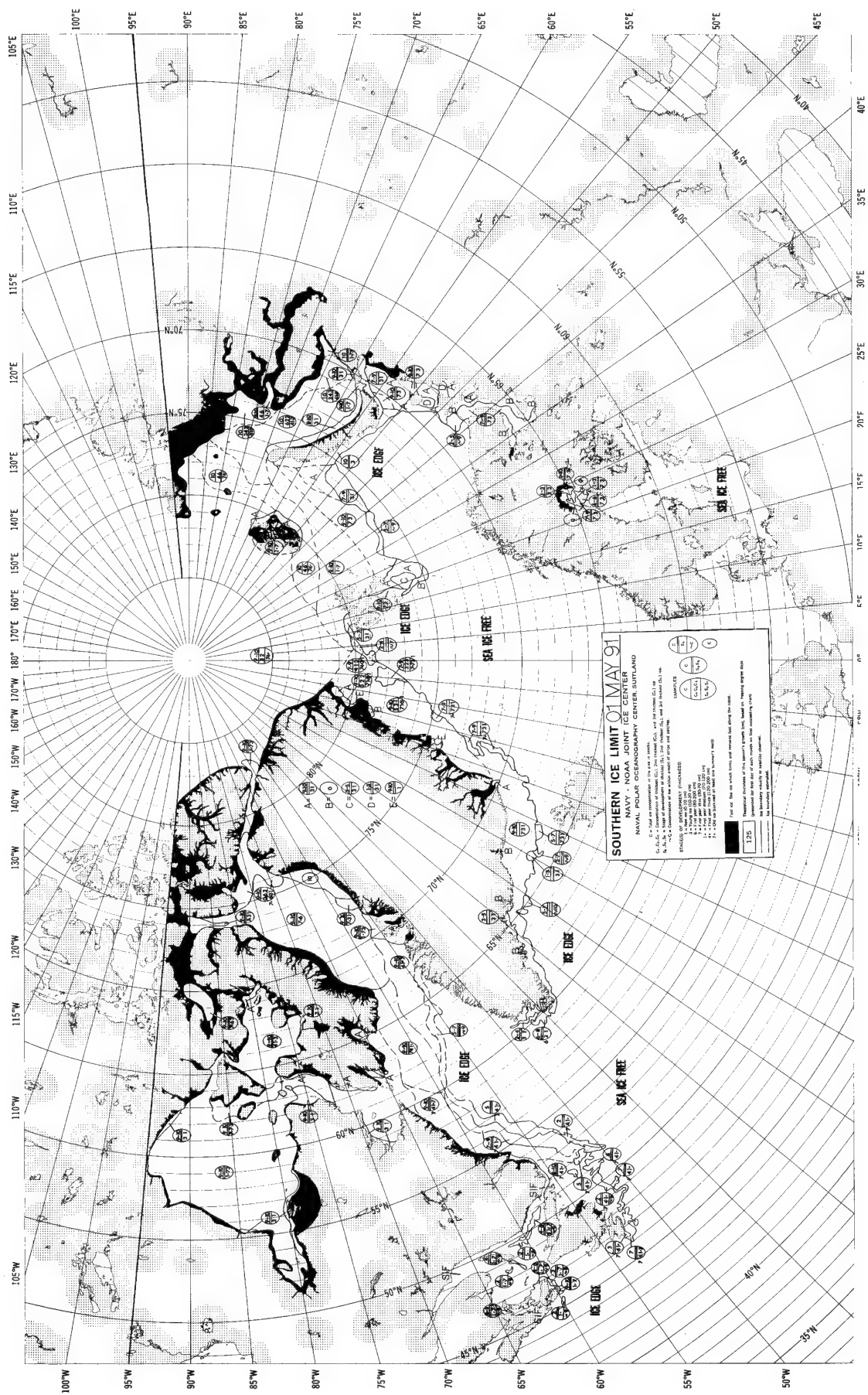
8. The ice-covered area is shown as a hatched area.

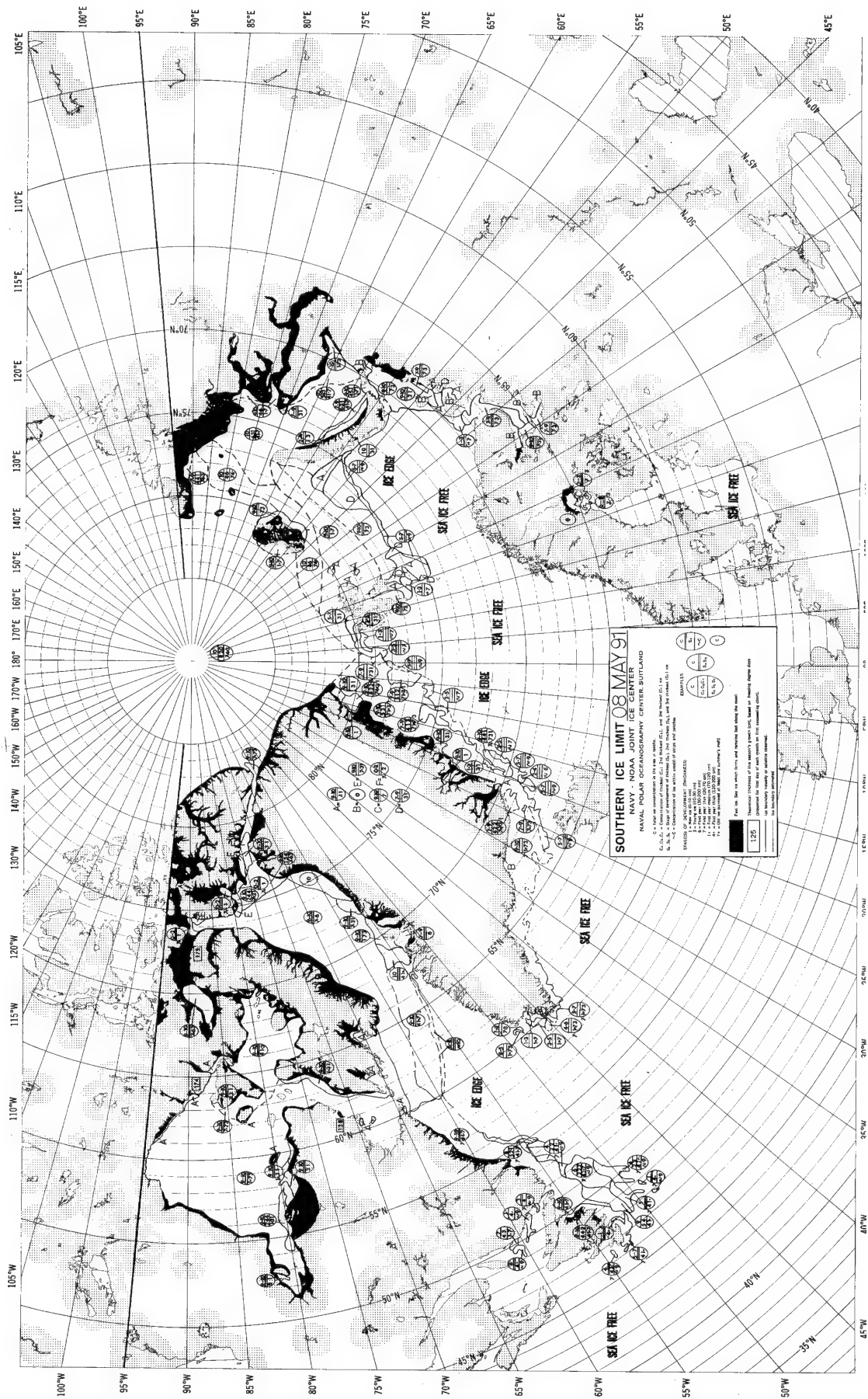
9. The ice limit is shown as a solid line, and the sea ice free area is shown as a shaded area.

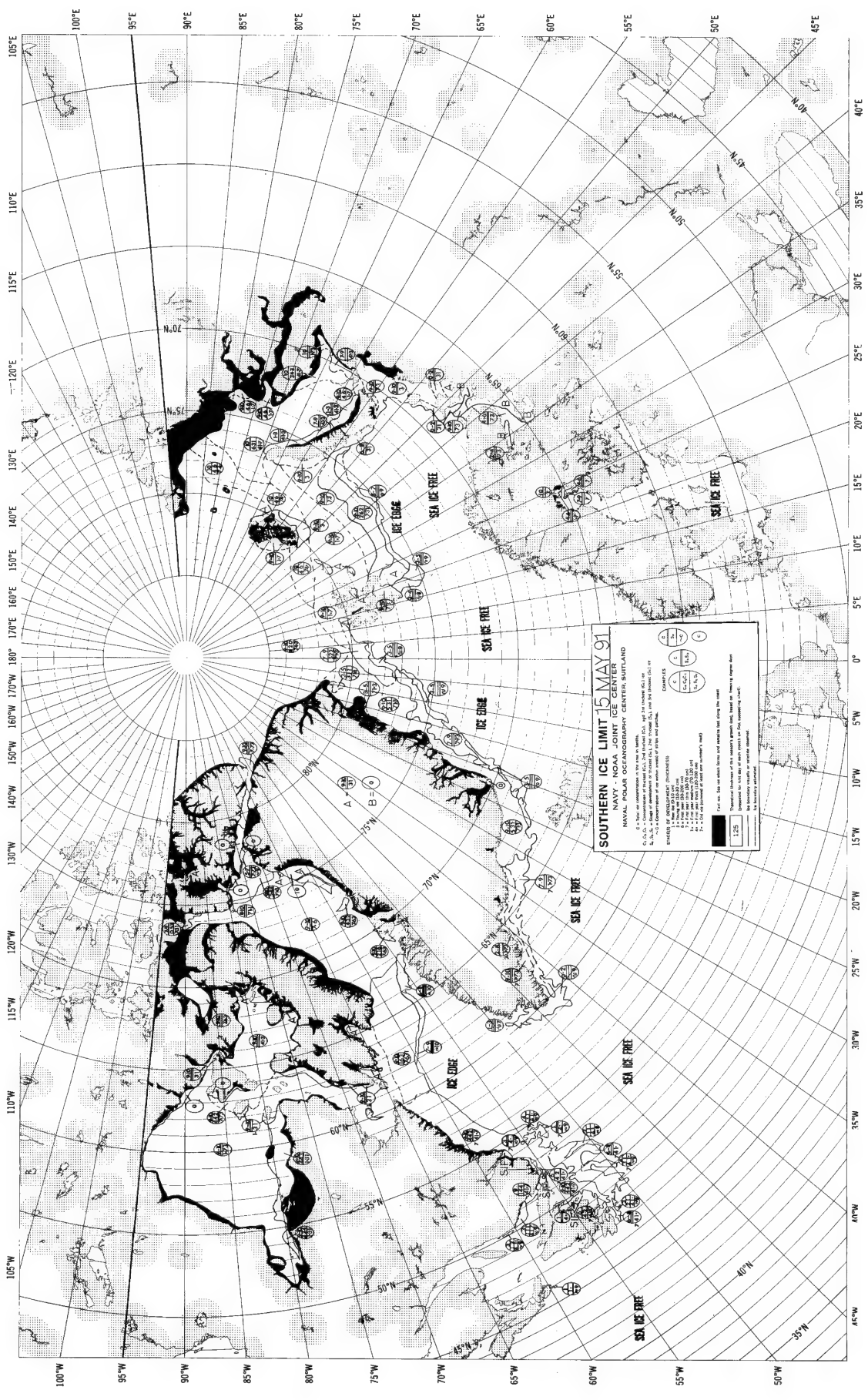
10. The ice-covered area is shown as a hatched area.











SOUTHERN ICE LIMIT 15 MAY 91
NAVY, NOAA, JOINT ICE CENTER
NAVY POLAR OCEANOGRAPHY CENTER, BUTLAND

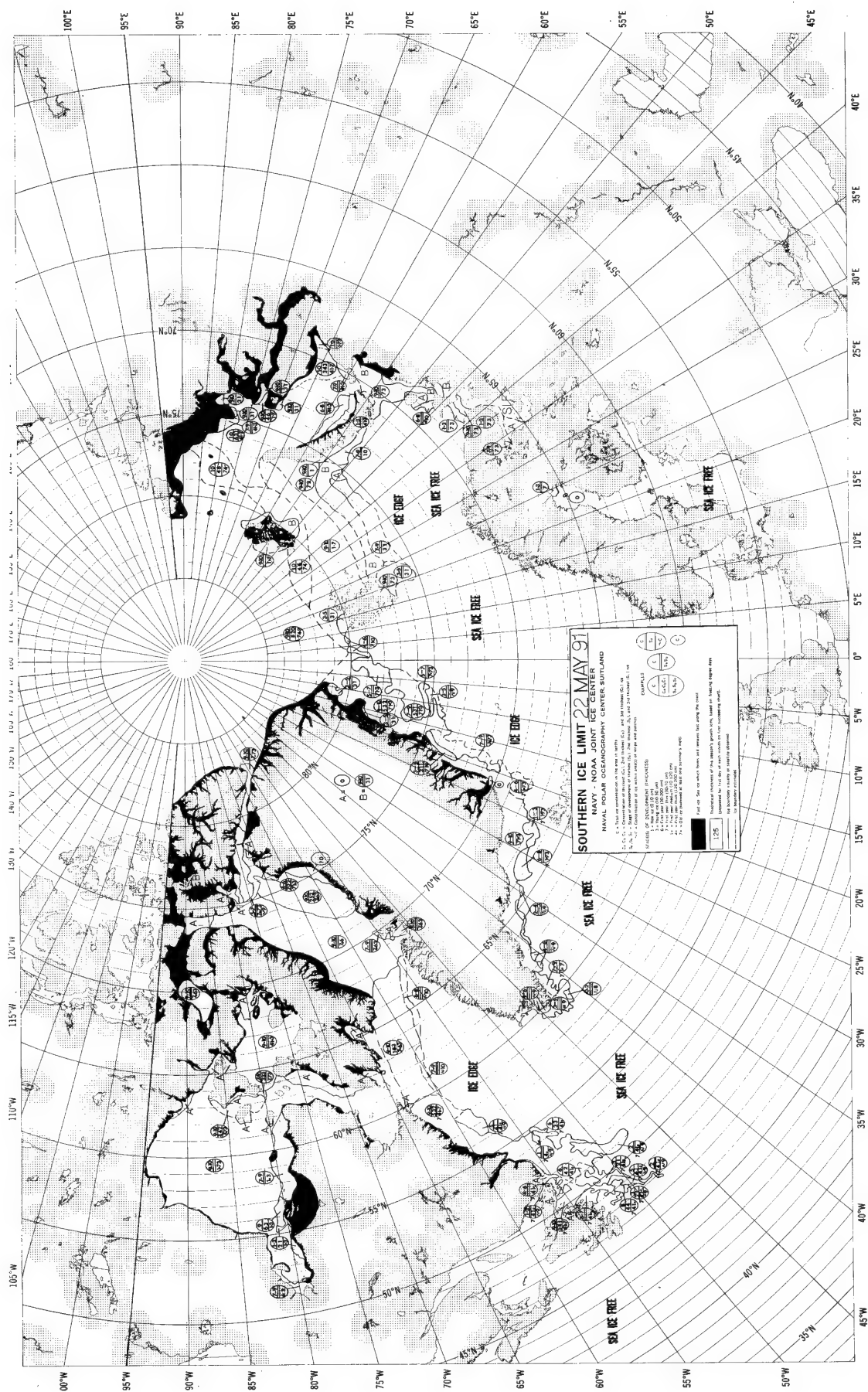
LEGEND

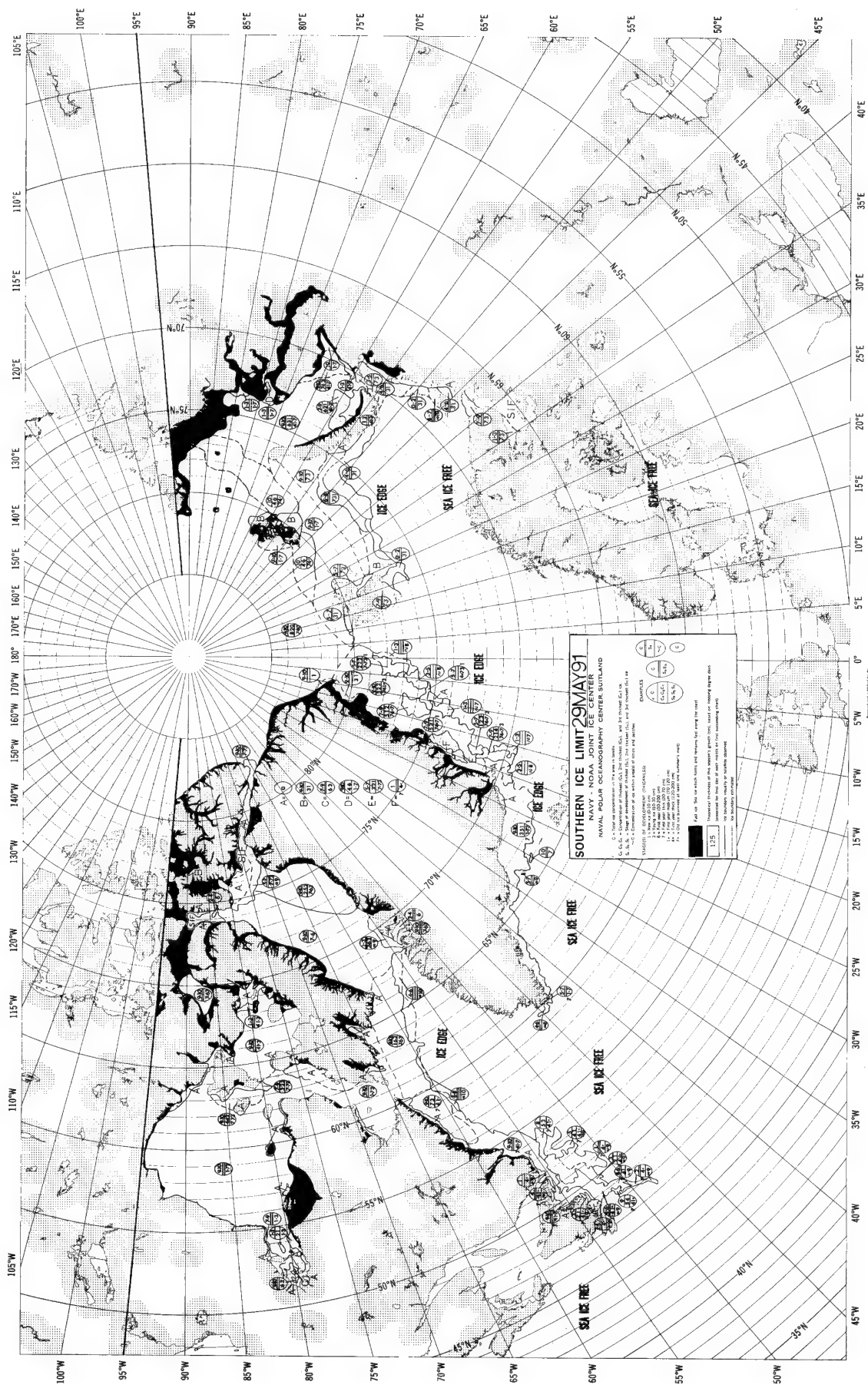
ICE TYPES

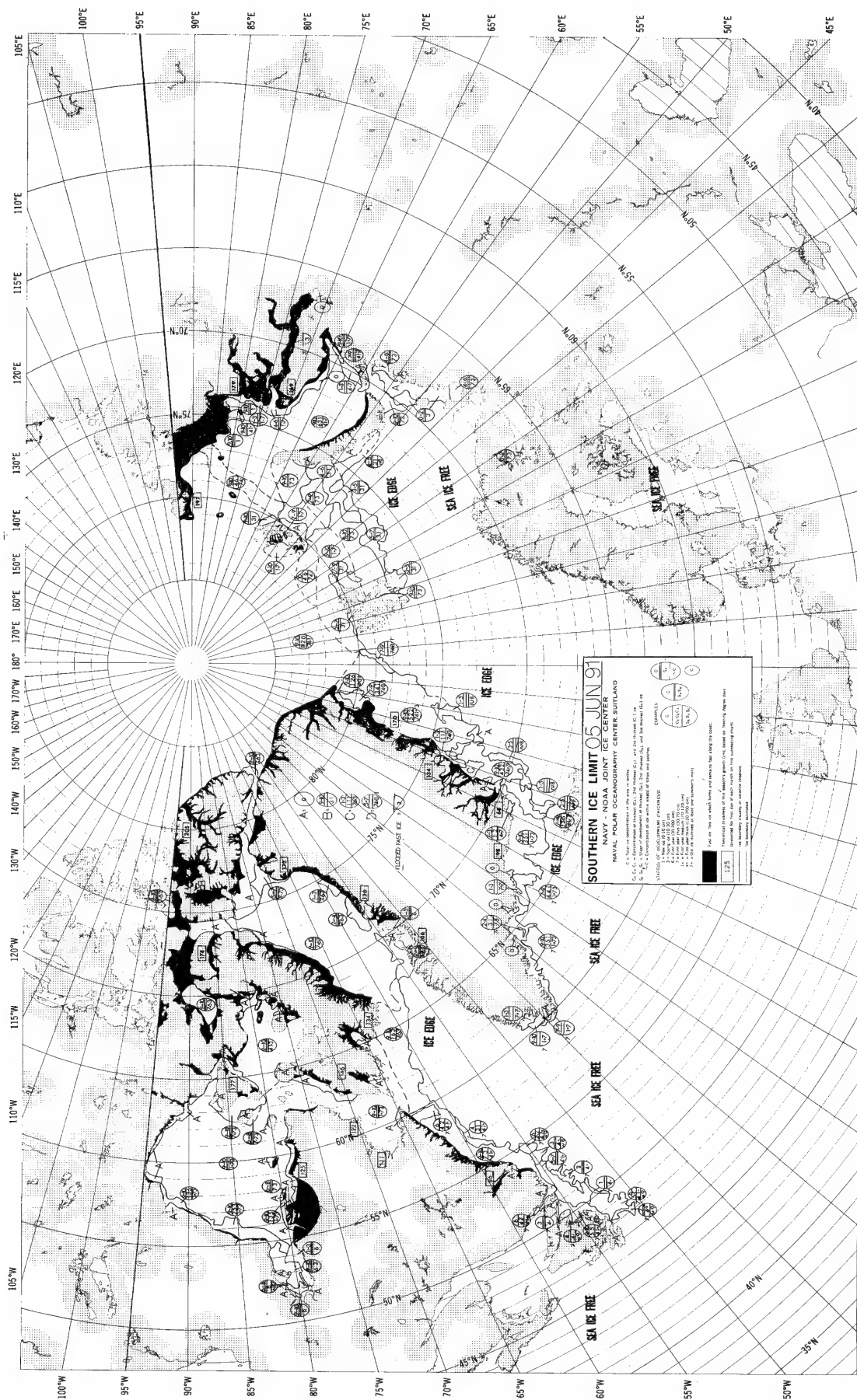
Symbol	Description
(A)	Iceberg
(B)	Iceberg
(C)	Iceberg
(D)	Iceberg
(E)	Iceberg
(F)	Iceberg
(G)	Iceberg
(H)	Iceberg
(I)	Iceberg
(J)	Iceberg
(K)	Iceberg
(L)	Iceberg
(M)	Iceberg
(N)	Iceberg
(O)	Iceberg
(P)	Iceberg
(Q)	Iceberg
(R)	Iceberg
(S)	Iceberg
(T)	Iceberg
(U)	Iceberg
(V)	Iceberg
(W)	Iceberg
(X)	Iceberg
(Y)	Iceberg
(Z)	Iceberg

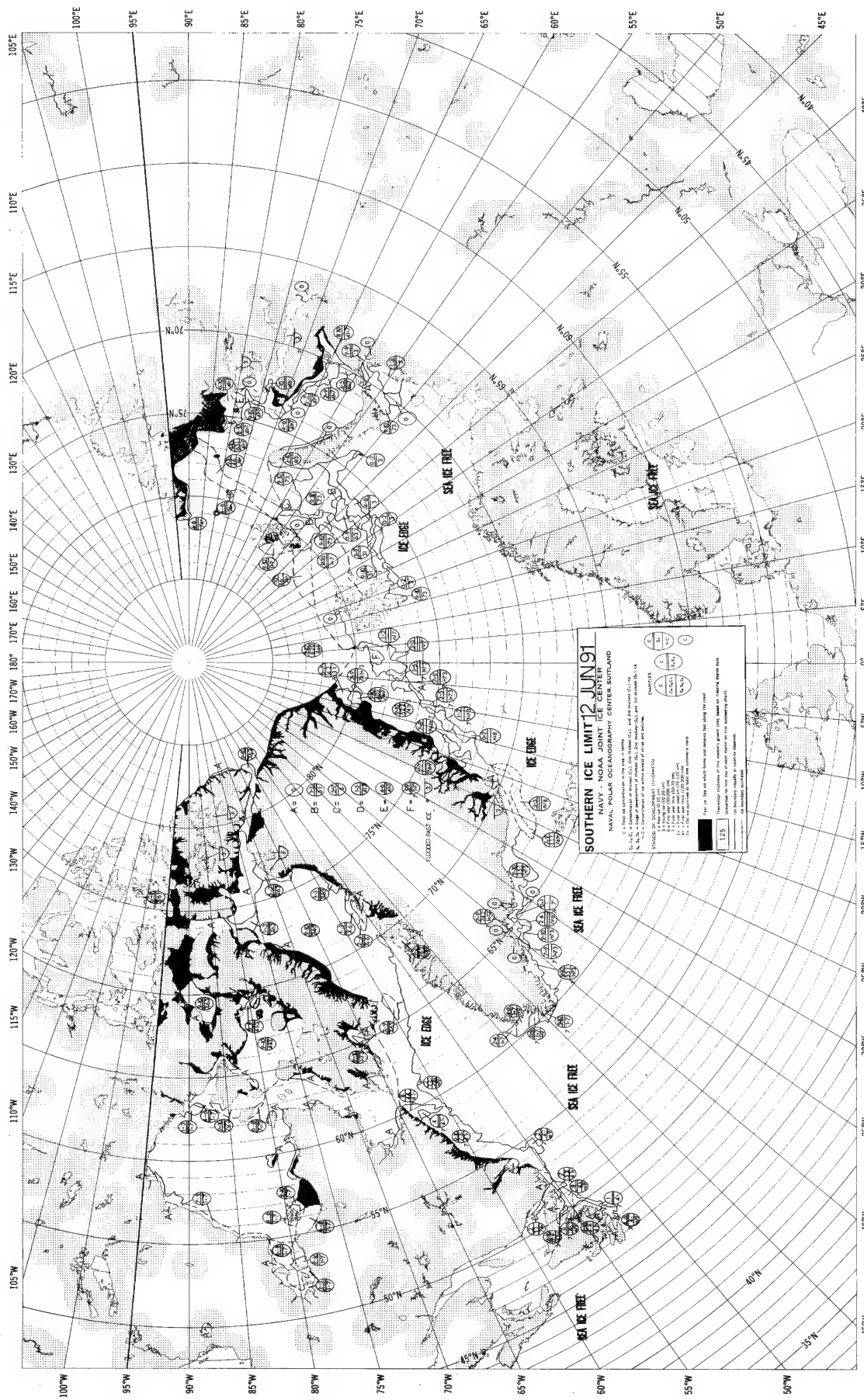
ICE LIMITS

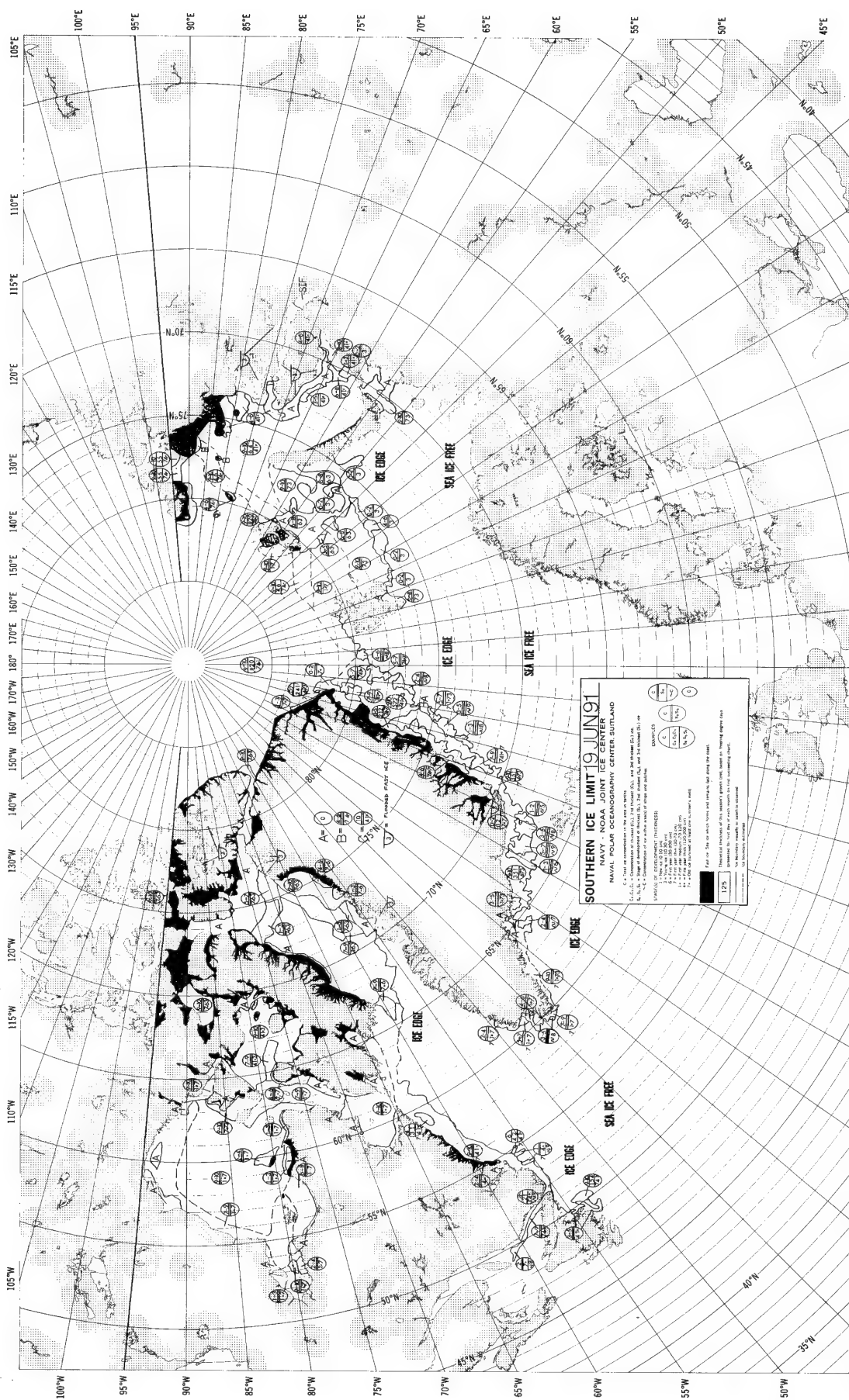
Symbol	Description
(1)	Iceberg
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(8)	Iceberg
(9)	Iceberg
(10)	Iceberg
(11)	Iceberg
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(13)	Iceberg
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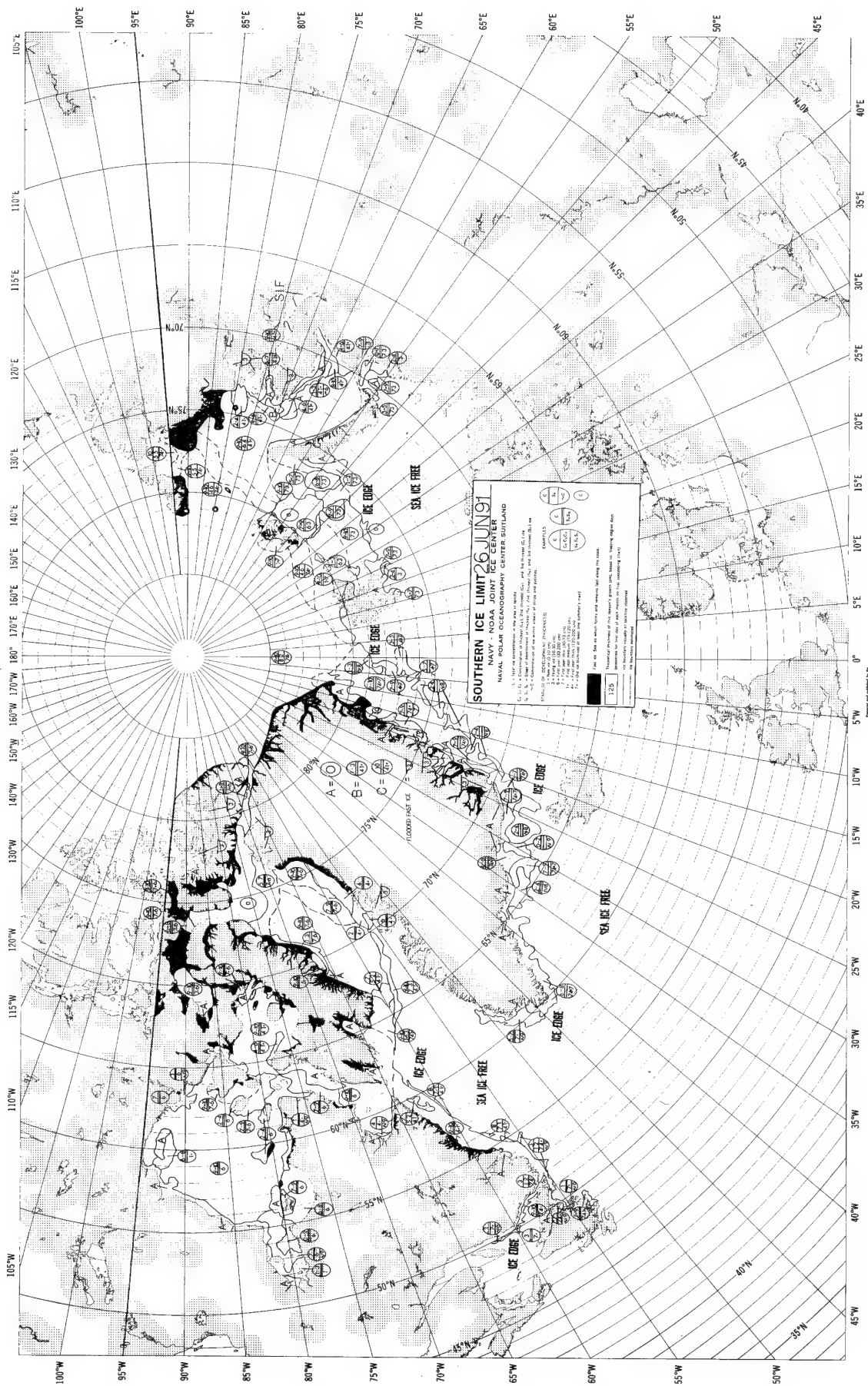


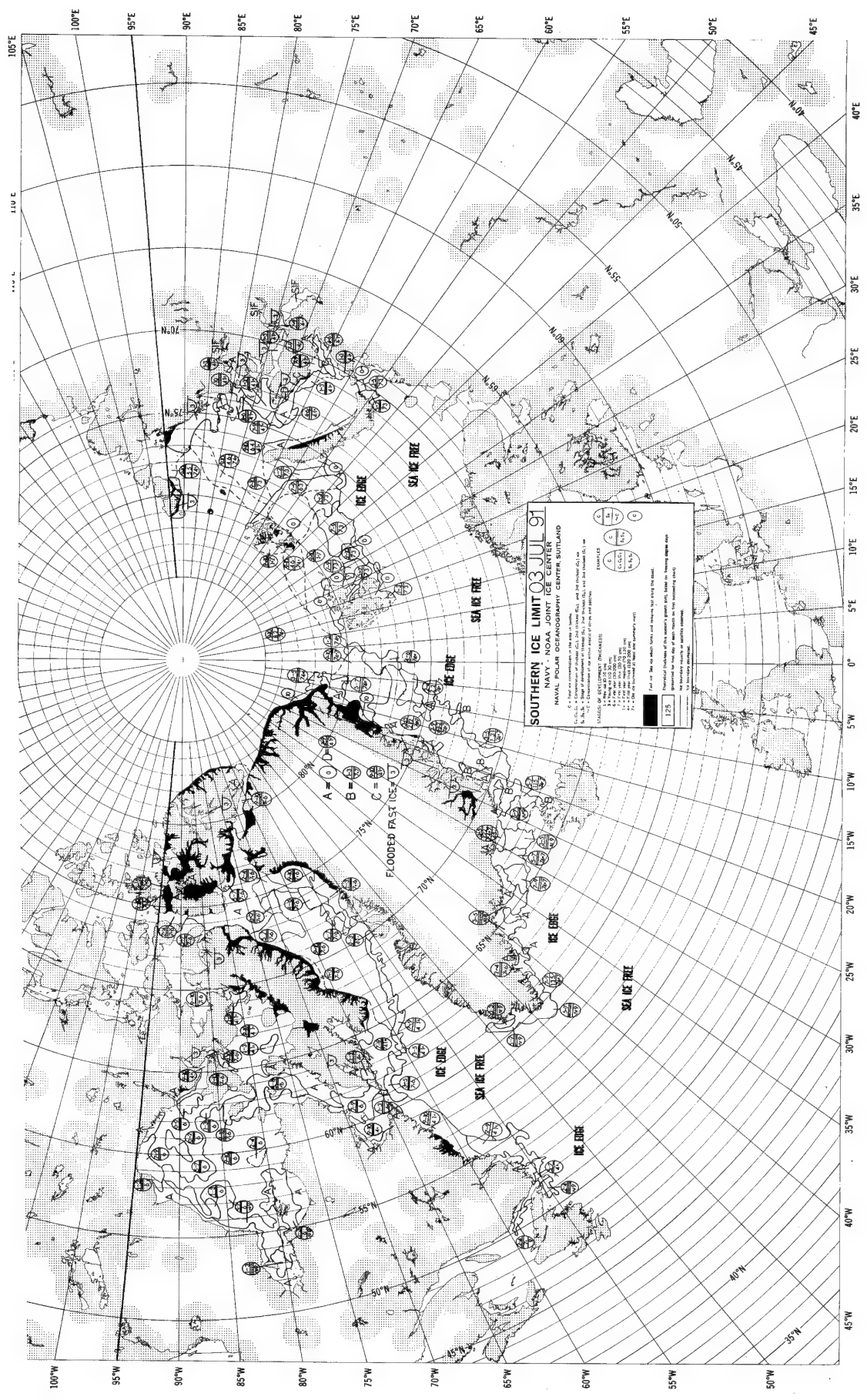












SOUTHERN ICE LIMIT 03 JUL 91
NAVAL POLAR OCEANOGRAPHY CENTER, ANTARCTICA

LEGEND

A = Total ice thickness in the area of study.
B = Total ice thickness in the area of study, excluding icebergs.
C = Total ice thickness in the area of study, excluding icebergs and icebergs less than 1000 feet in length.

ICE THICKNESS

Symbol	Thickness (feet)
1	1-2
2	3-4
3	5-6
4	7-8
5	9-10
6	11-12
7	13-14
8	15-16
9	17-18
10	19-20
11	21-22
12	23-24
13	25-26
14	27-28
15	29-30
16	31-32
17	33-34
18	35-36
19	37-38
20	39-40
21	41-42
22	43-44
23	45-46
24	47-48
25	49-50
26	51-52
27	53-54
28	55-56
29	57-58
30	59-60
31	61-62
32	63-64
33	65-66
34	67-68
35	69-70
36	71-72
37	73-74
38	75-76
39	77-78
40	79-80
41	81-82
42	83-84
43	85-86
44	87-88
45	89-90
46	91-92
47	93-94
48	95-96
49	97-98
50	99-100

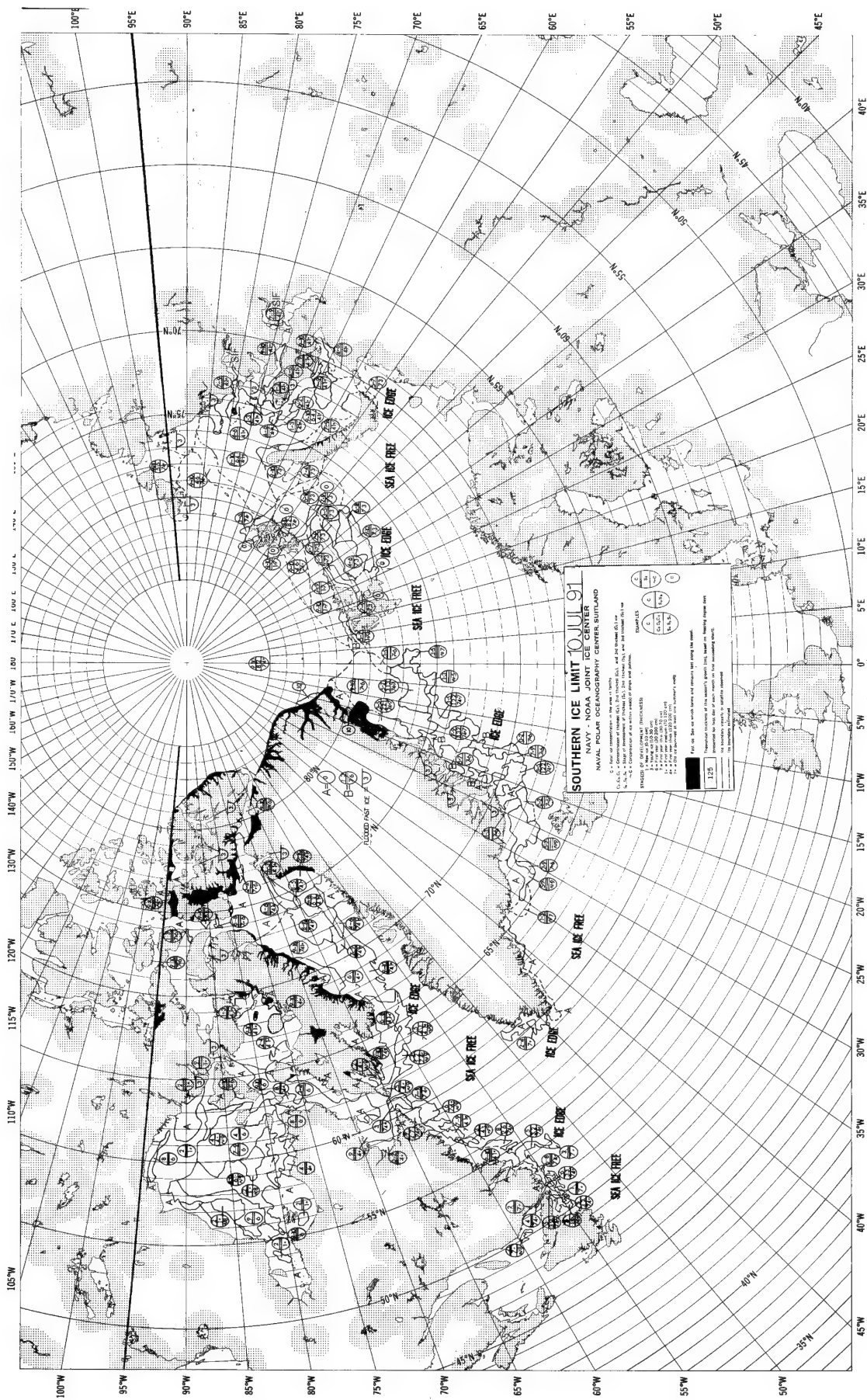
ICE DENSITY

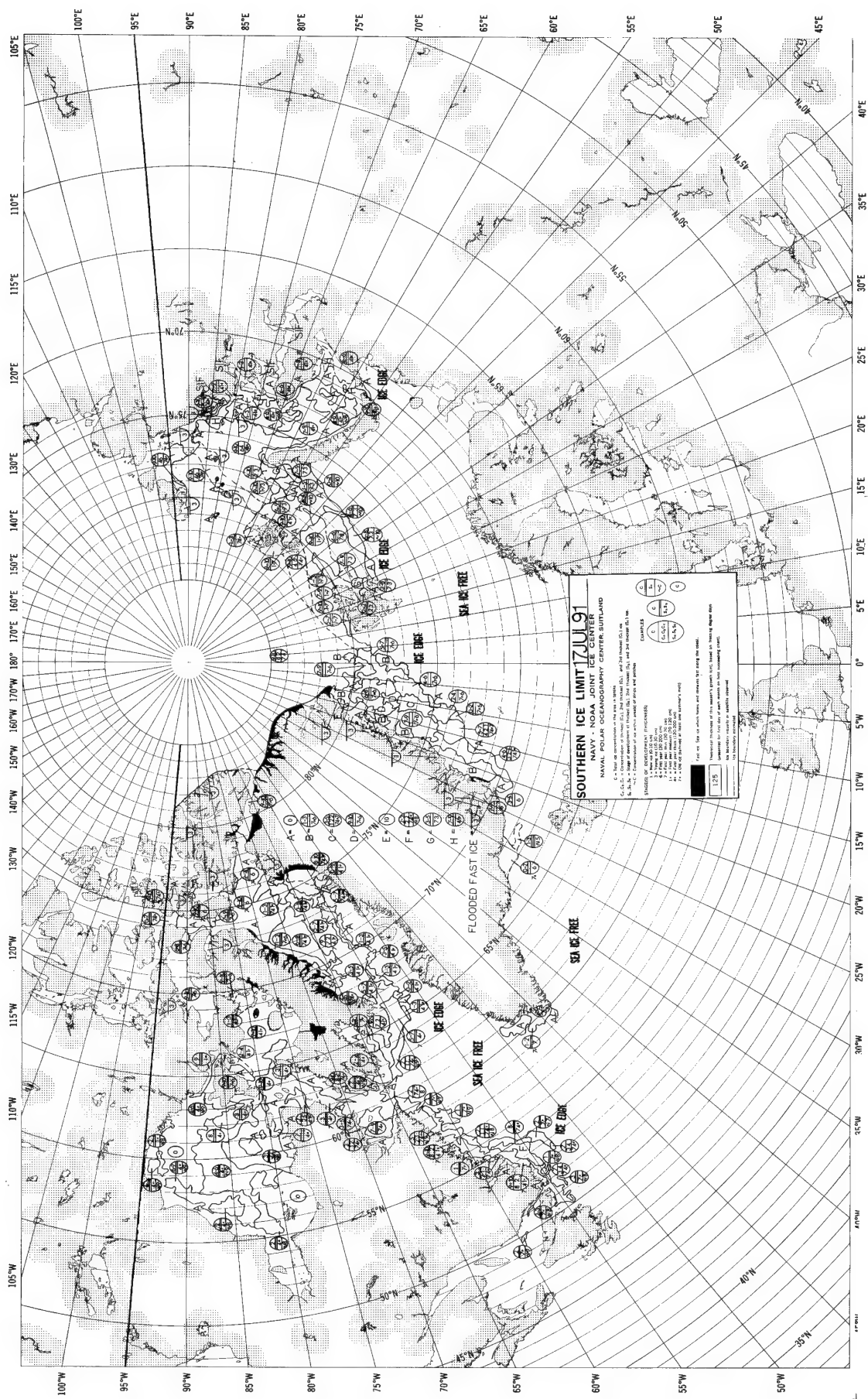
Symbol	Density (kg/m³)
1	0.915
2	0.916
3	0.917
4	0.918
5	0.919
6	0.920
7	0.921
8	0.922
9	0.923
10	0.924
11	0.925
12	0.926
13	0.927
14	0.928
15	0.929
16	0.930
17	0.931
18	0.932
19	0.933
20	0.934
21	0.935
22	0.936
23	0.937
24	0.938
25	0.939
26	0.940
27	0.941
28	0.942
29	0.943
30	0.944
31	0.945
32	0.946
33	0.947
34	0.948
35	0.949
36	0.950
37	0.951
38	0.952
39	0.953
40	0.954
41	0.955
42	0.956
43	0.957
44	0.958
45	0.959
46	0.960
47	0.961
48	0.962
49	0.963
50	0.964

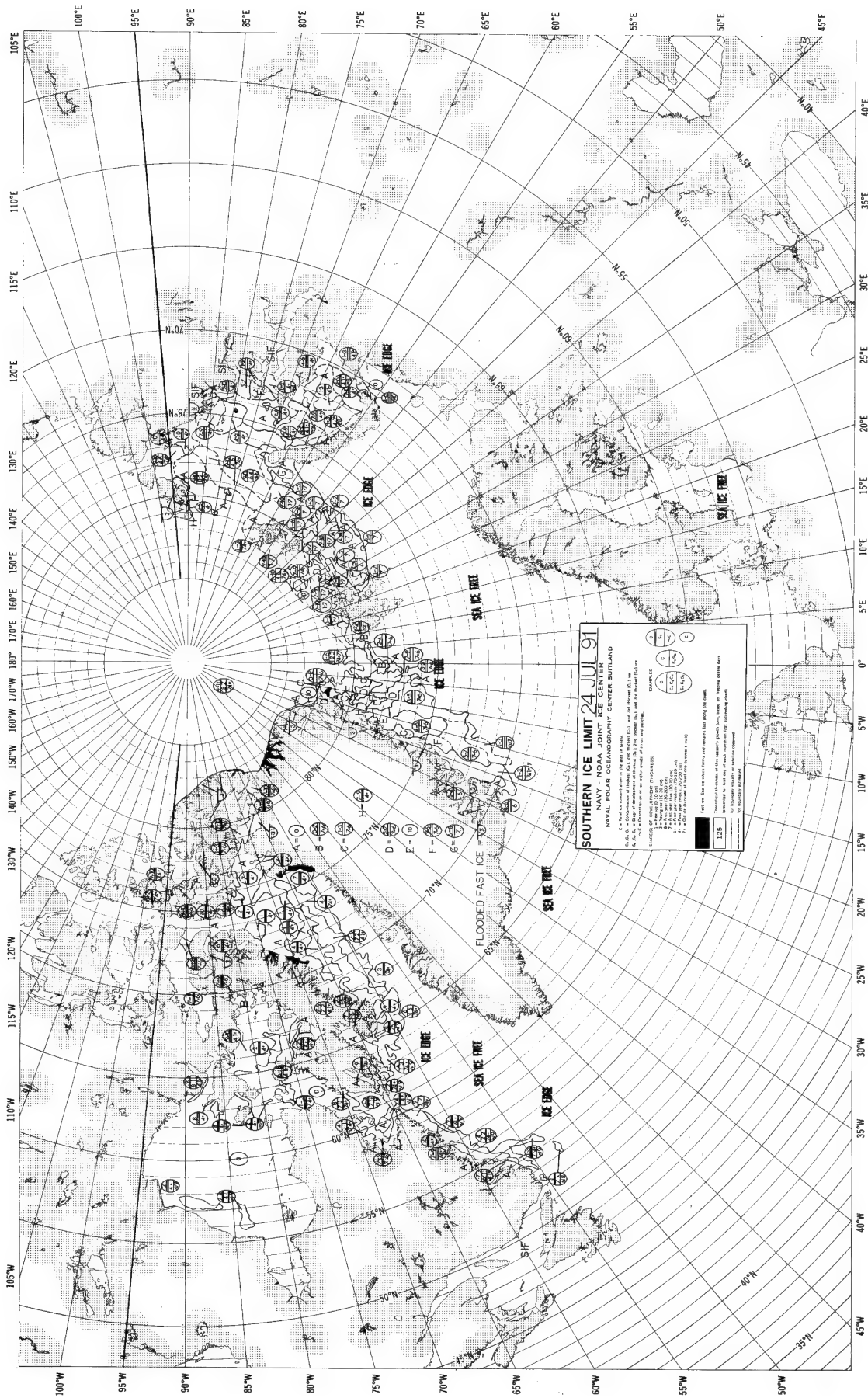
For use by the user only. Do not use for navigation. For use only by the user.

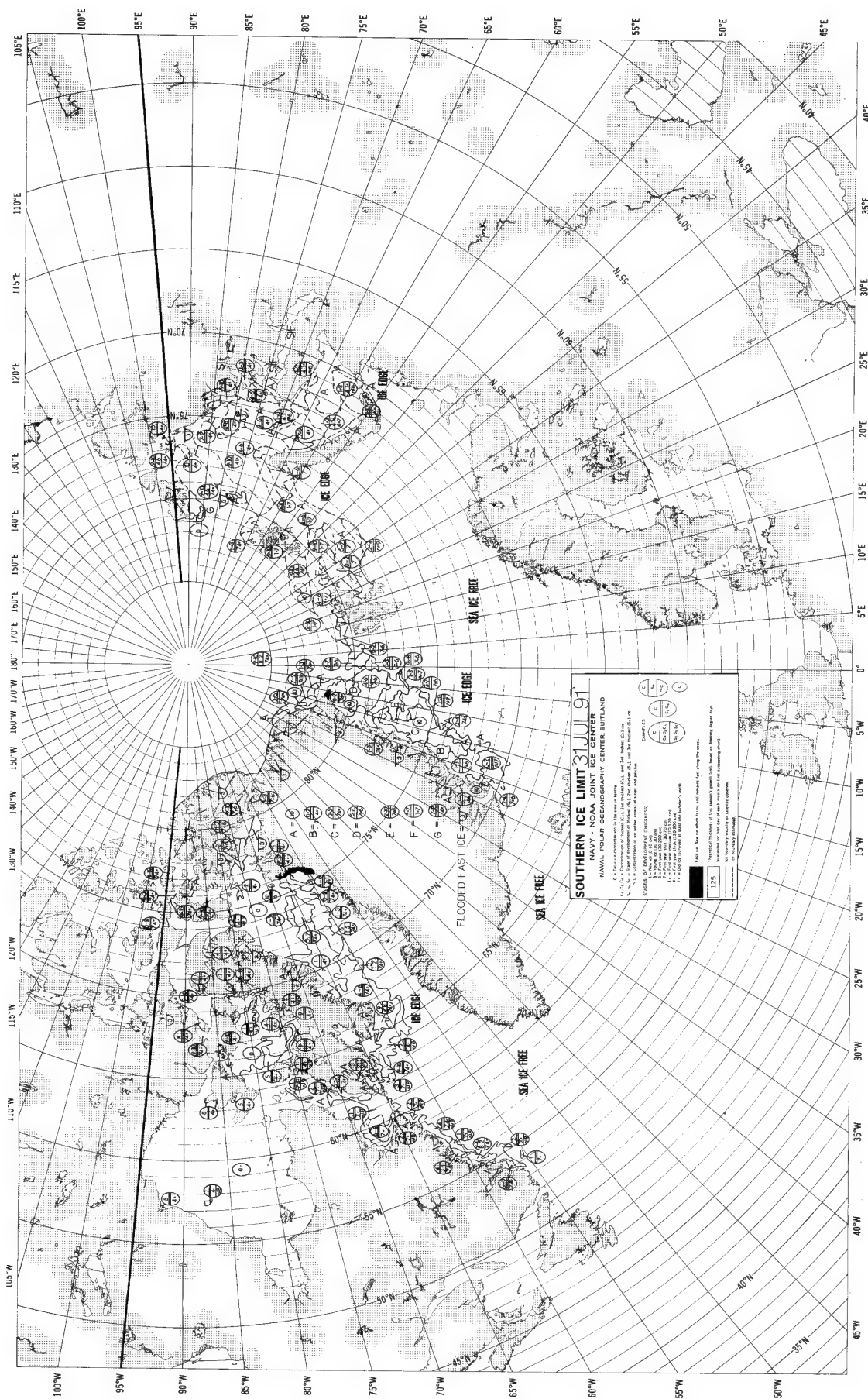
Revised edition of the user's guide. See the user's guide for more information.

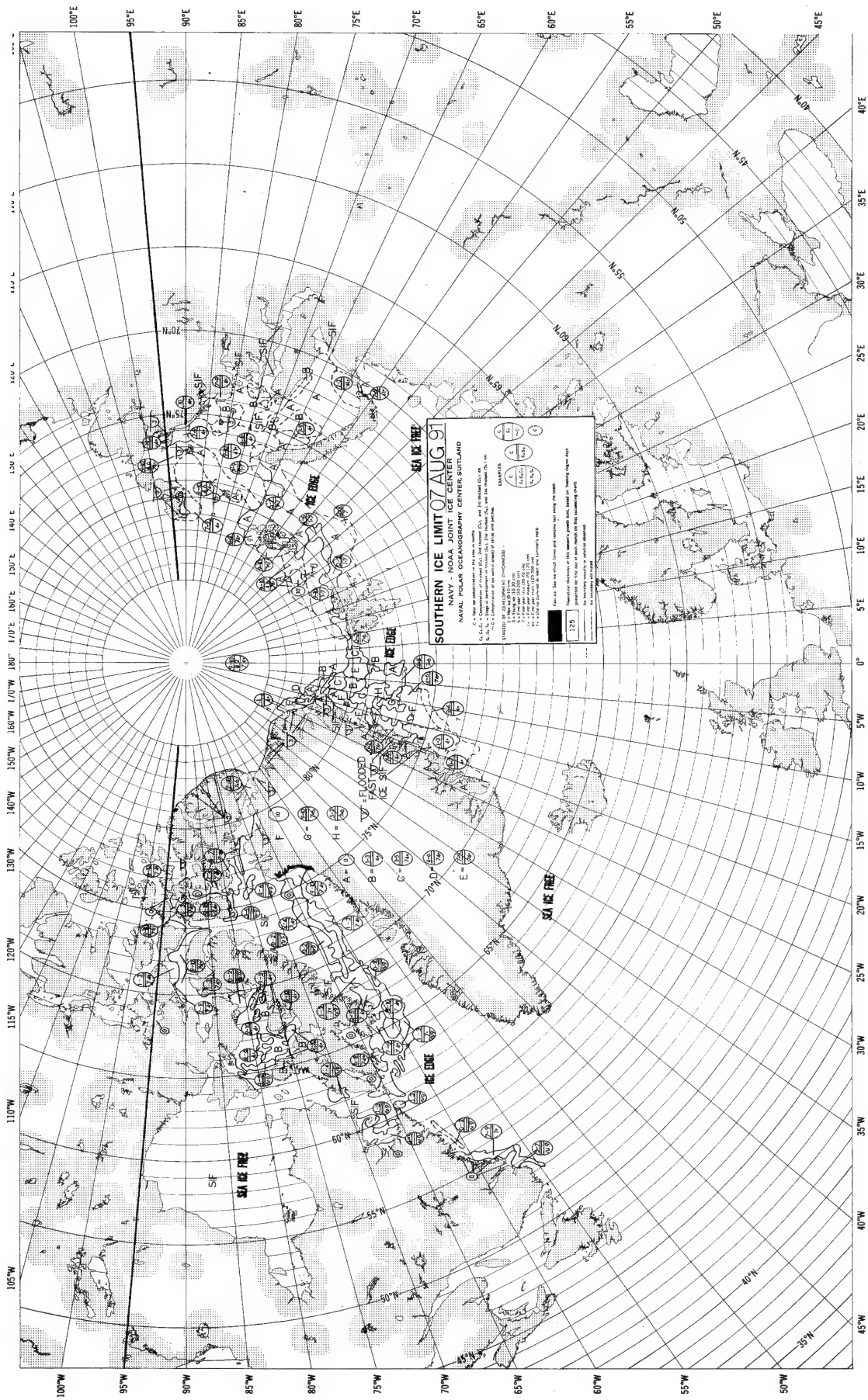
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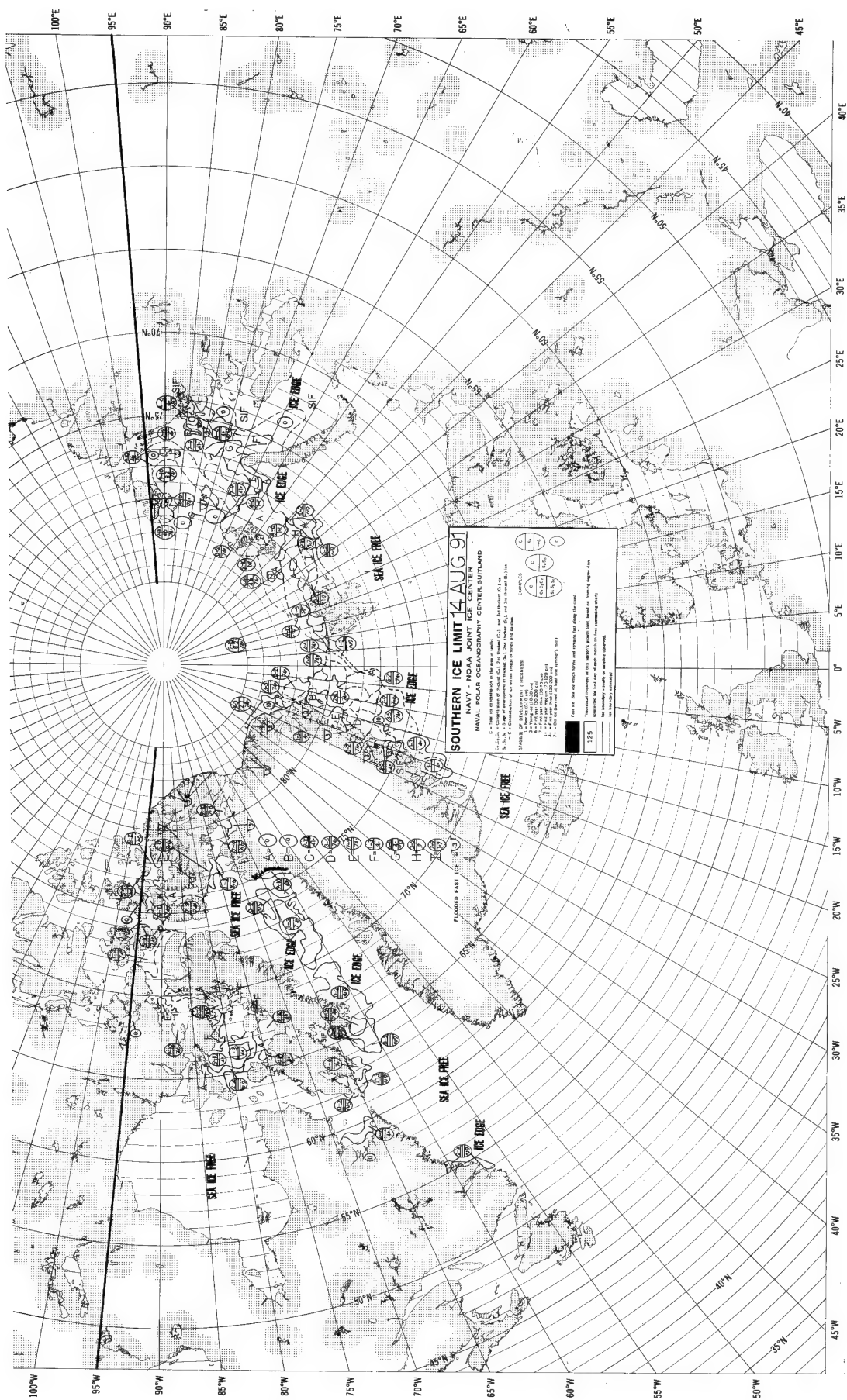


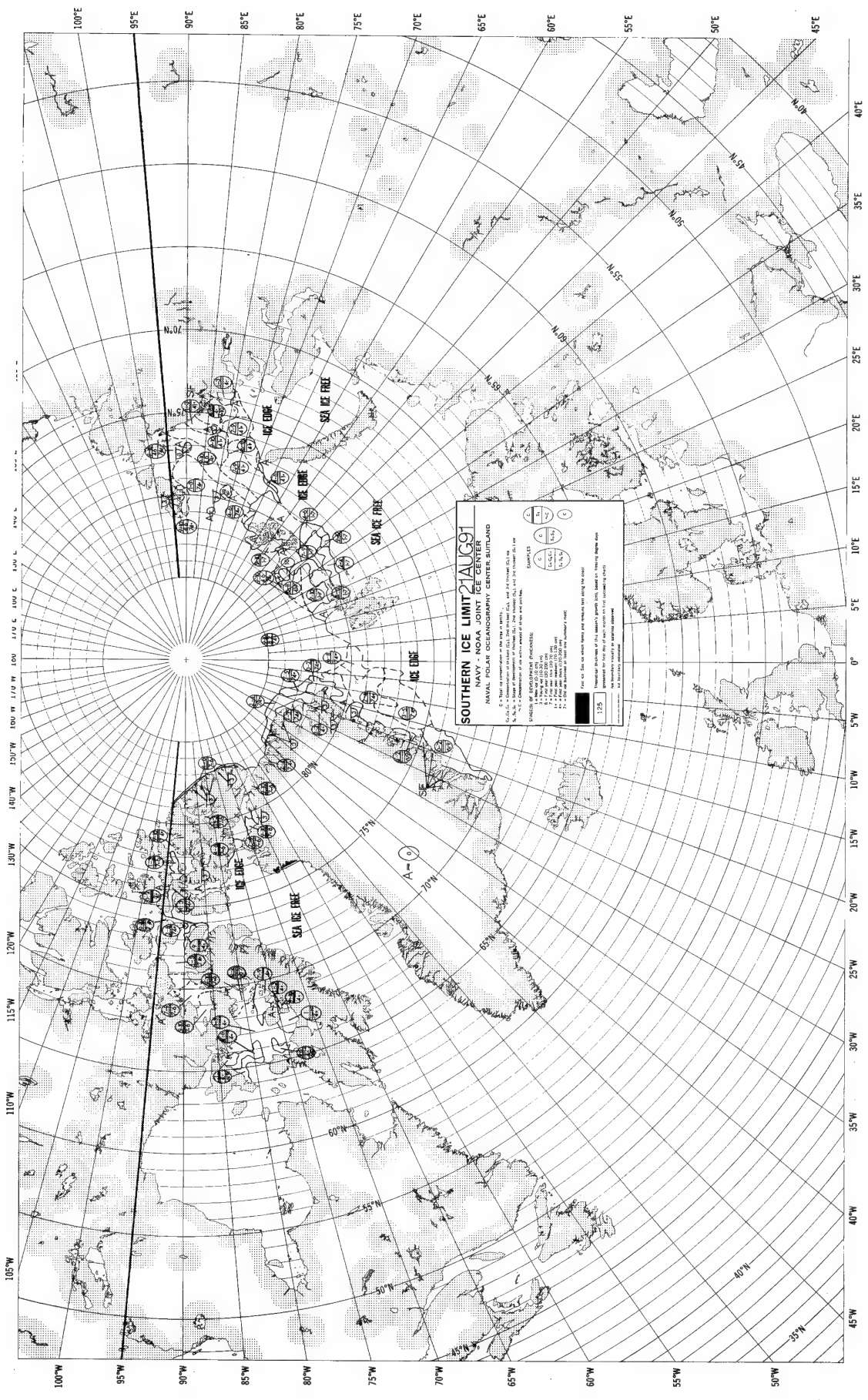


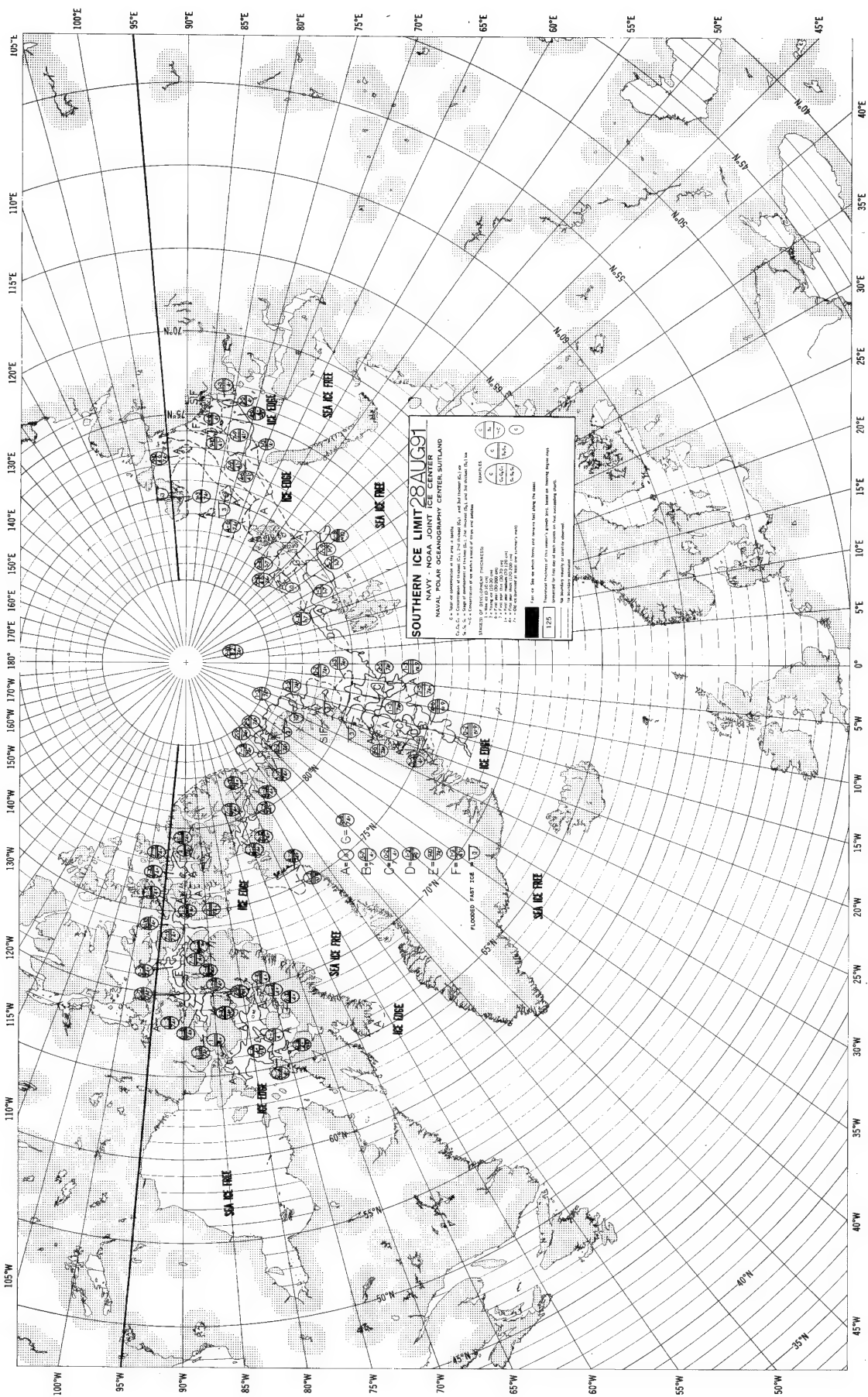


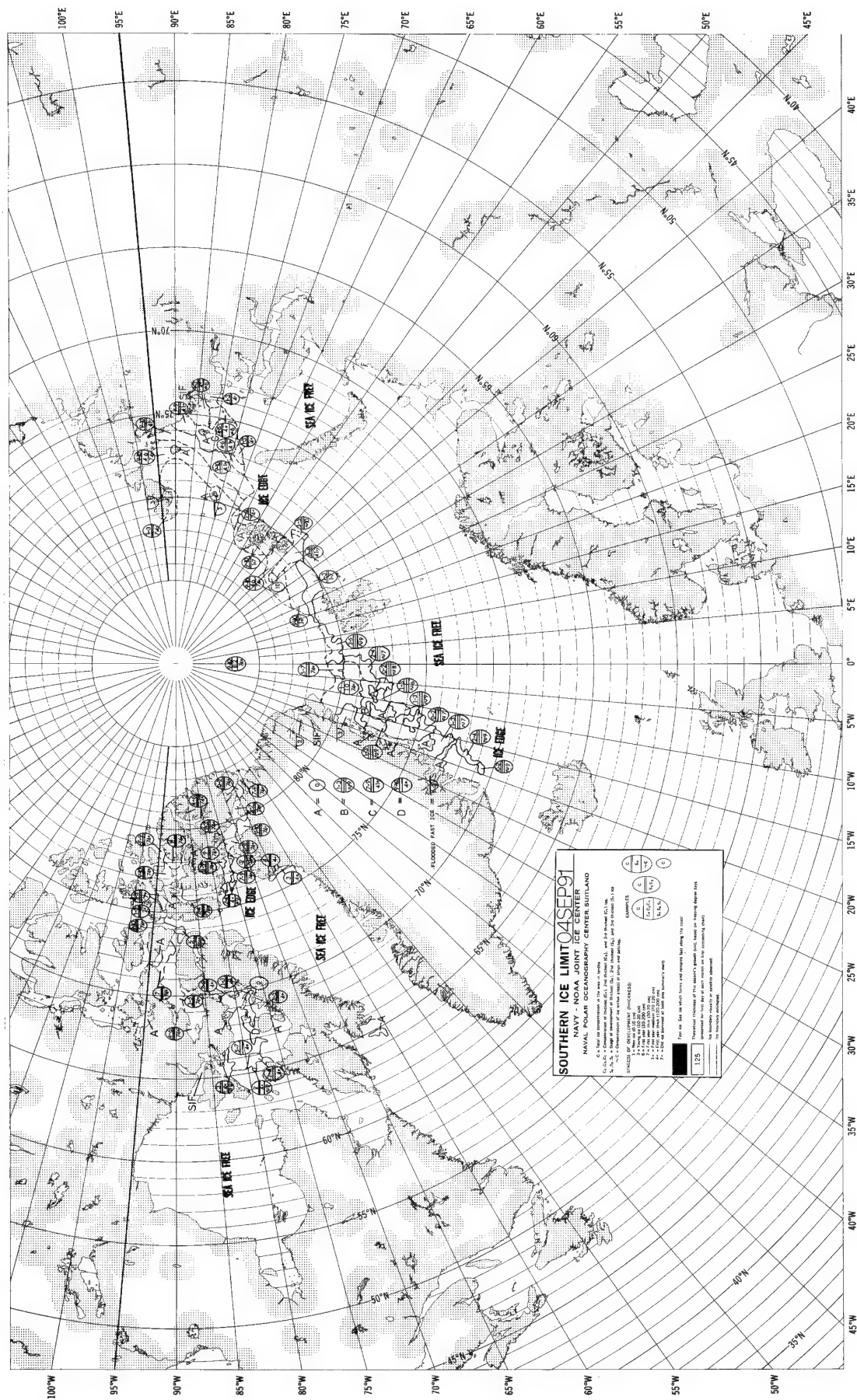


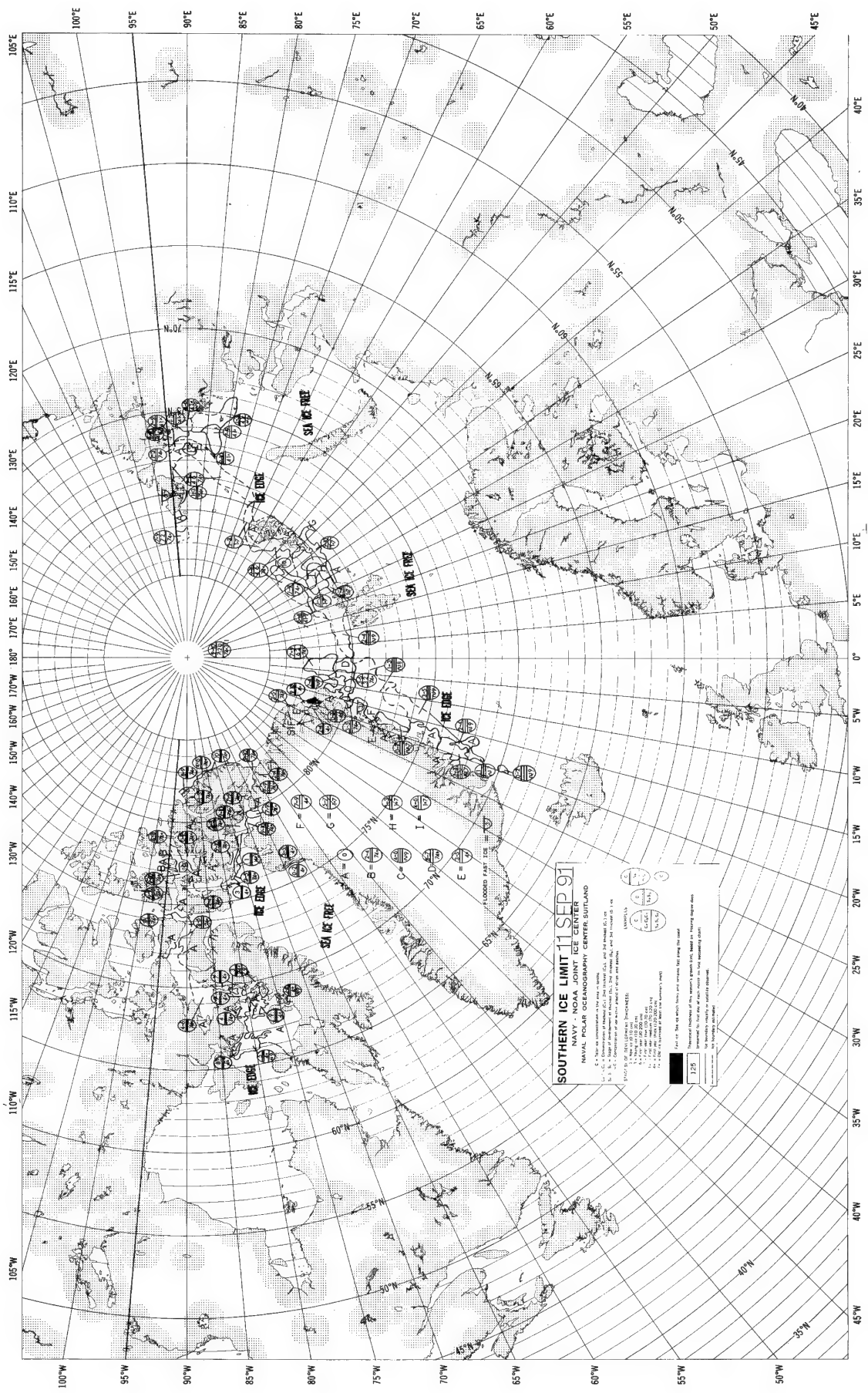




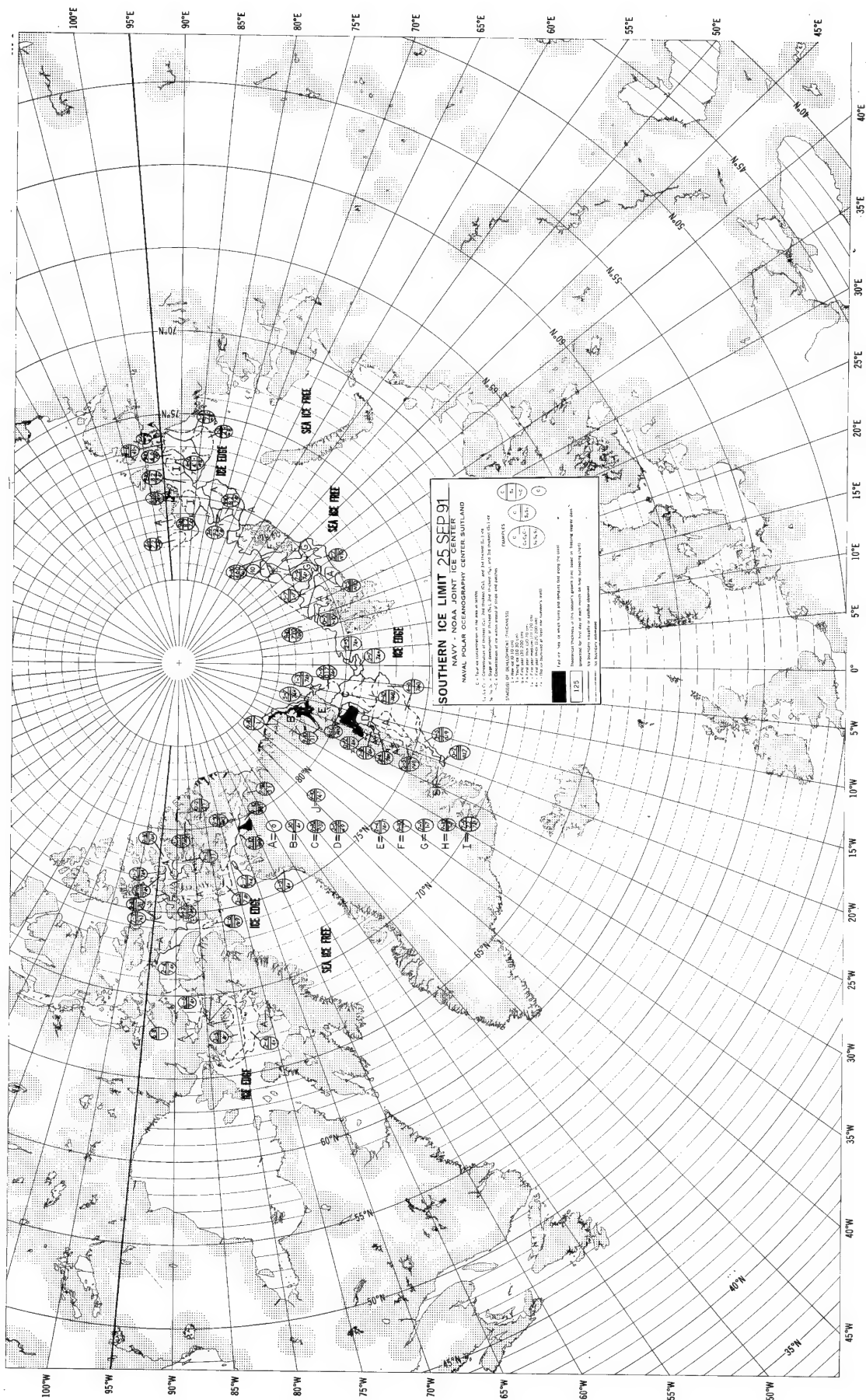


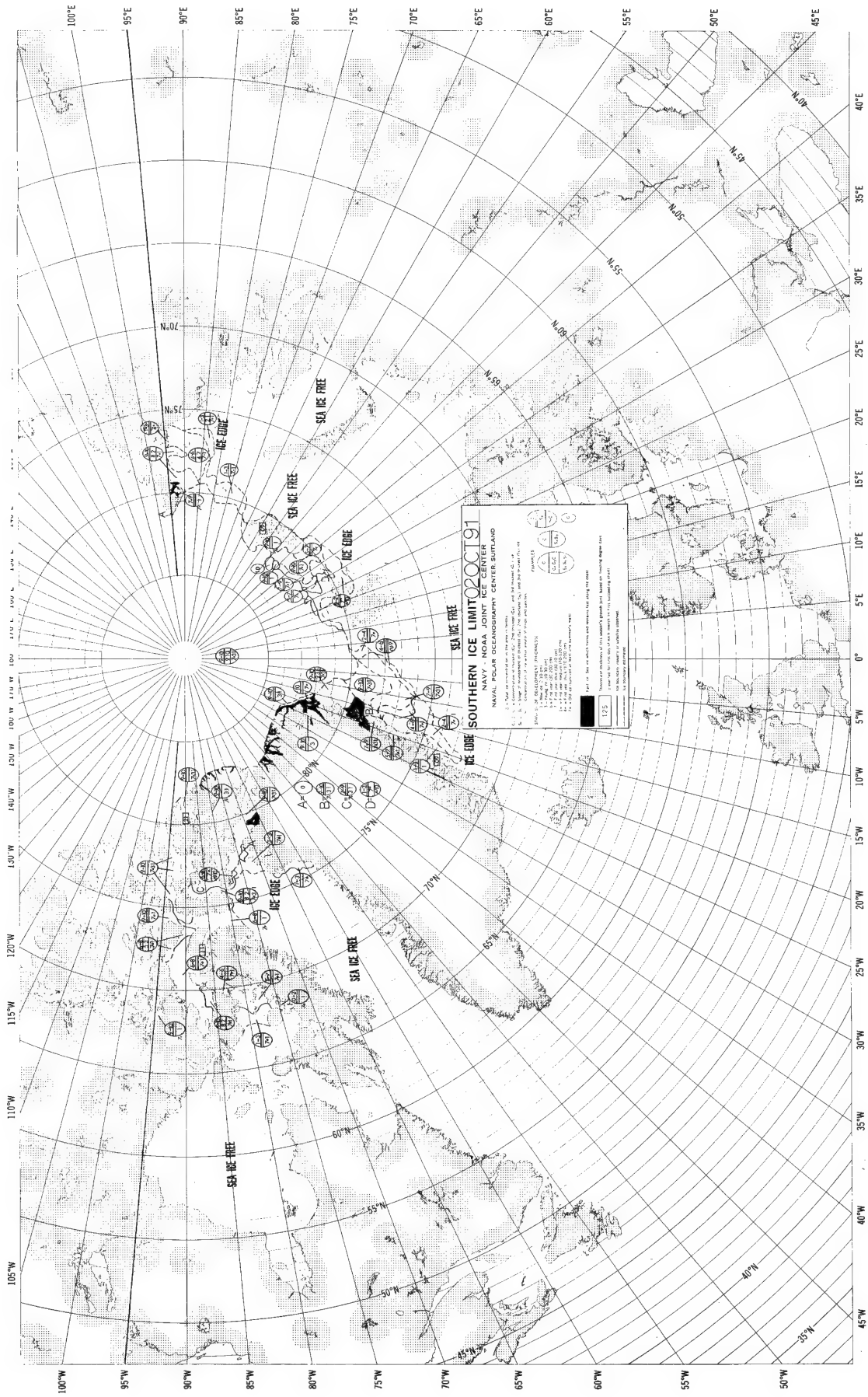


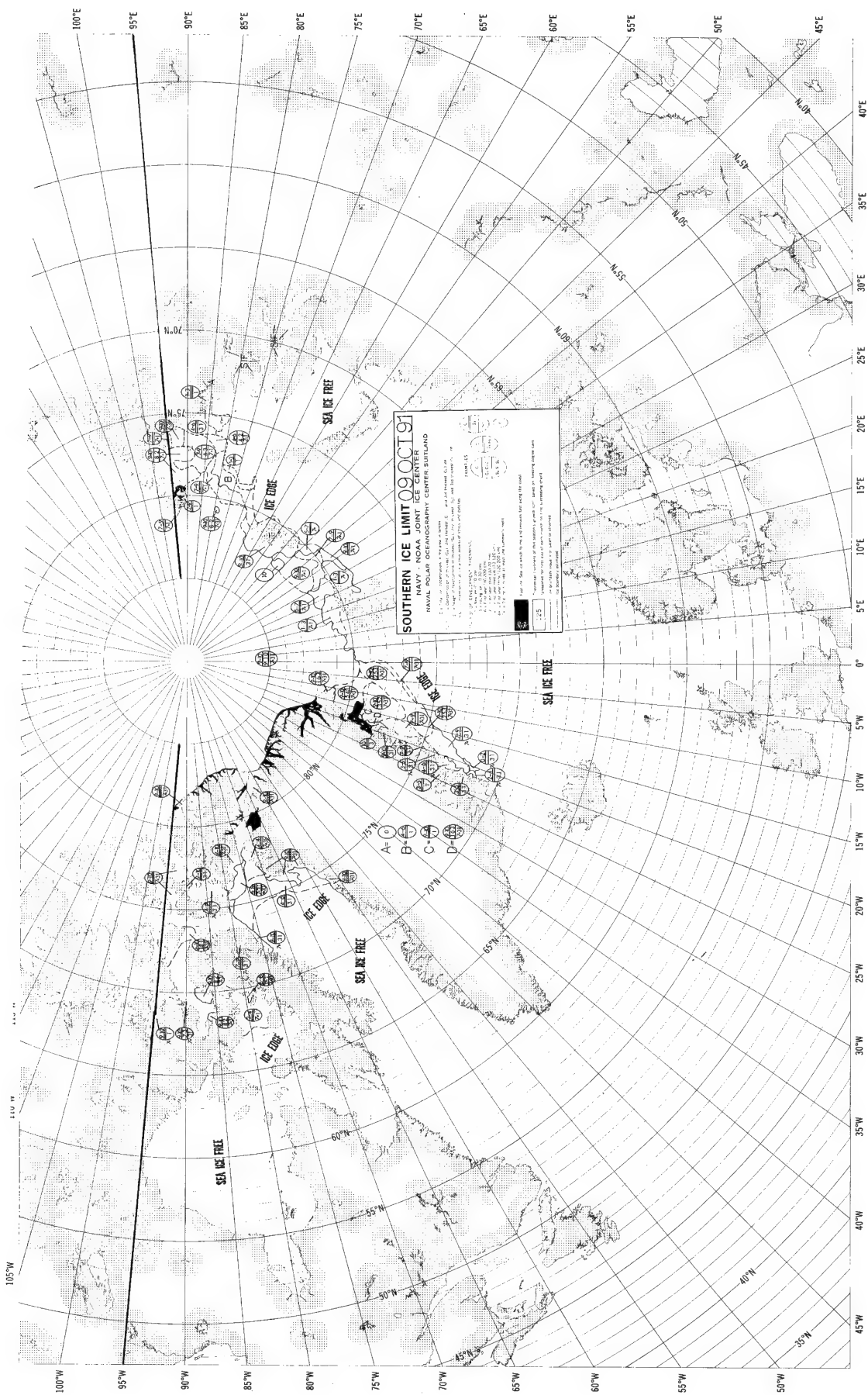


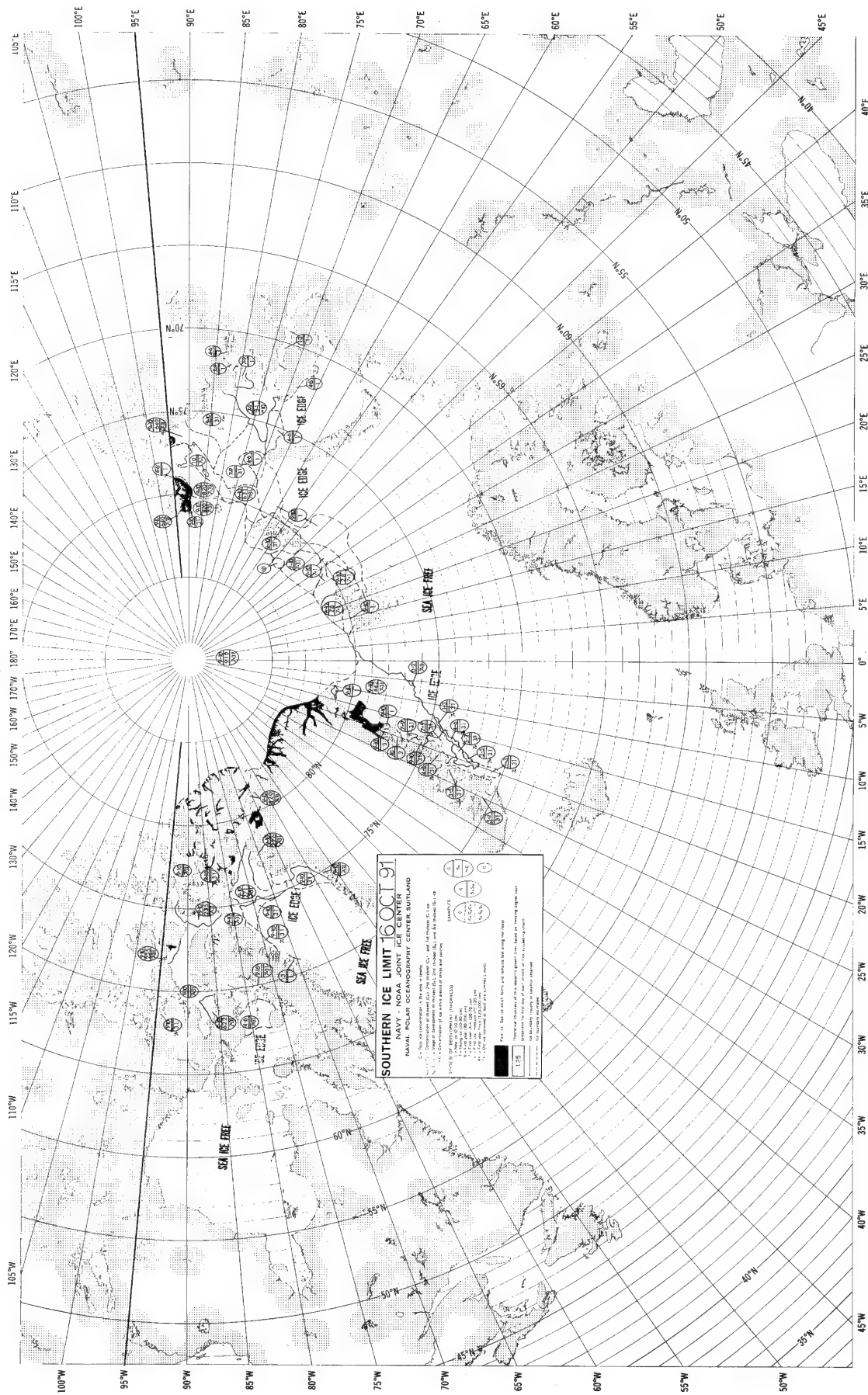


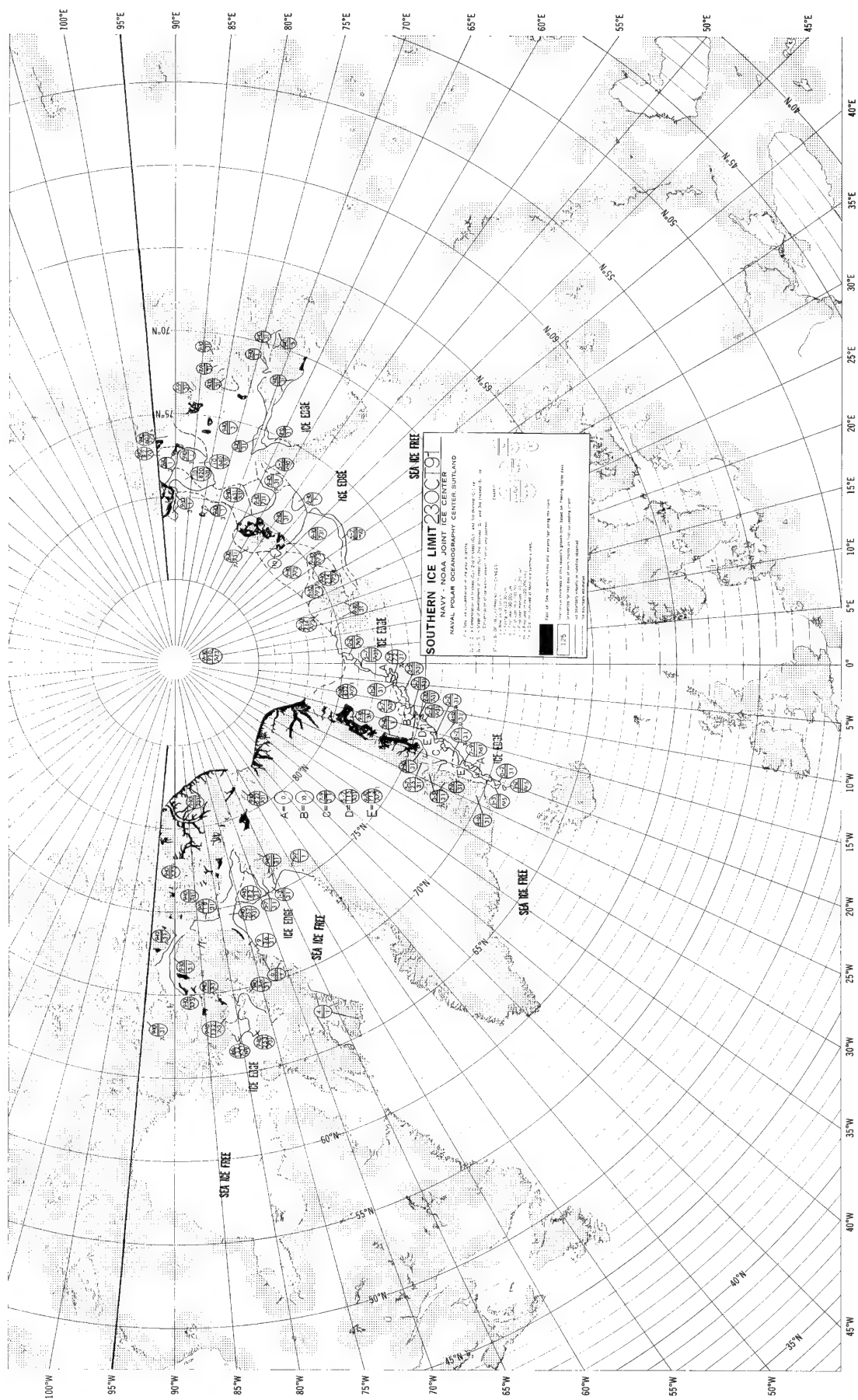
SOUTHERN ICE LIMIT 11 SEP 91
NAVY & NOAA JOINT ICE CENTER
NATL. PHYS. OCEANOGRAPHY CENTER, SUTLAND
1. 10°S - 40°S, 105°W - 40°E
2. 10°S - 40°S, 105°W - 40°E
3. 10°S - 40°S, 105°W - 40°E
4. 10°S - 40°S, 105°W - 40°E
5. 10°S - 40°S, 105°W - 40°E
6. 10°S - 40°S, 105°W - 40°E
7. 10°S - 40°S, 105°W - 40°E
8. 10°S - 40°S, 105°W - 40°E
9. 10°S - 40°S, 105°W - 40°E
10. 10°S - 40°S, 105°W - 40°E
11. 10°S - 40°S, 105°W - 40°E
12. 10°S - 40°S, 105°W - 40°E
13. 10°S - 40°S, 105°W - 40°E
14. 10°S - 40°S, 105°W - 40°E
15. 10°S - 40°S, 105°W - 40°E
16. 10°S - 40°S, 105°W - 40°E
17. 10°S - 40°S, 105°W - 40°E
18. 10°S - 40°S, 105°W - 40°E
19. 10°S - 40°S, 105°W - 40°E
20. 10°S - 40°S, 105°W - 40°E
21. 10°S - 40°S, 105°W - 40°E
22. 10°S - 40°S, 105°W - 40°E
23. 10°S - 40°S, 105°W - 40°E
24. 10°S - 40°S, 105°W - 40°E
25. 10°S - 40°S, 105°W - 40°E
26. 10°S - 40°S, 105°W - 40°E
27. 10°S - 40°S, 105°W - 40°E
28. 10°S - 40°S, 105°W - 40°E
29. 10°S - 40°S, 105°W - 40°E
30. 10°S - 40°S, 105°W - 40°E
31. 10°S - 40°S, 105°W - 40°E
32. 10°S - 40°S, 105°W - 40°E
33. 10°S - 40°S, 105°W - 40°E
34. 10°S - 40°S, 105°W - 40°E
35. 10°S - 40°S, 105°W - 40°E
36. 10°S - 40°S, 105°W - 40°E
37. 10°S - 40°S, 105°W - 40°E
38. 10°S - 40°S, 105°W - 40°E
39. 10°S - 40°S, 105°W - 40°E
40. 10°S - 40°S, 105°W - 40°E
41. 10°S - 40°S, 105°W - 40°E
42. 10°S - 40°S, 105°W - 40°E
43. 10°S - 40°S, 105°W - 40°E
44. 10°S - 40°S, 105°W - 40°E
45. 10°S - 40°S, 105°W - 40°E
46. 10°S - 40°S, 105°W - 40°E
47. 10°S - 40°S, 105°W - 40°E
48. 10°S - 40°S, 105°W - 40°E
49. 10°S - 40°S, 105°W - 40°E
50. 10°S - 40°S, 105°W - 40°E
51. 10°S - 40°S, 105°W - 40°E
52. 10°S - 40°S, 105°W - 40°E
53. 10°S - 40°S, 105°W - 40°E
54. 10°S - 40°S, 105°W - 40°E
55. 10°S - 40°S, 105°W - 40°E
56. 10°S - 40°S, 105°W - 40°E
57. 10°S - 40°S, 105°W - 40°E
58. 10°S - 40°S, 105°W - 40°E
59. 10°S - 40°S, 105°W - 40°E
60. 10°S - 40°S, 105°W - 40°E
61. 10°S - 40°S, 105°W - 40°E
62. 10°S - 40°S, 105°W - 40°E
63. 10°S - 40°S, 105°W - 40°E
64. 10°S - 40°S, 105°W - 40°E
65. 10°S - 40°S, 105°W - 40°E
66. 10°S - 40°S, 105°W - 40°E
67. 10°S - 40°S, 105°W - 40°E
68. 10°S - 40°S, 105°W - 40°E
69. 10°S - 40°S, 105°W - 40°E
70. 10°S - 40°S, 105°W - 40°E
71. 10°S - 40°S, 105°W - 40°E
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74. 10°S - 40°S, 105°W - 40°E
75. 10°S - 40°S, 105°W - 40°E
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78. 10°S - 40°S, 105°W - 40°E
79. 10°S - 40°S, 105°W - 40°E
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82. 10°S - 40°S, 105°W - 40°E
83. 10°S - 40°S, 105°W - 40°E
84. 10°S - 40°S, 105°W - 40°E
85. 10°S - 40°S, 105°W - 40°E
86. 10°S - 40°S, 105°W - 40°E
87. 10°S - 40°S, 105°W - 40°E
88. 10°S - 40°S, 105°W - 40°E
89. 10°S - 40°S, 105°W - 40°E
90. 10°S - 40°S, 105°W - 40°E
91. 10°S - 40°S, 105°W - 40°E
92. 10°S - 40°S, 105°W - 40°E
93. 10°S - 40°S, 105°W - 40°E
94. 10°S - 40°S, 105°W - 40°E
95. 10°S - 40°S, 105°W - 40°E
96. 10°S - 40°S, 105°W - 40°E
97. 10°S - 40°S, 105°W - 40°E
98. 10°S - 40°S, 105°W - 40°E
99. 10°S - 40°S, 105°W - 40°E
100. 10°S - 40°S, 105°W - 40°E

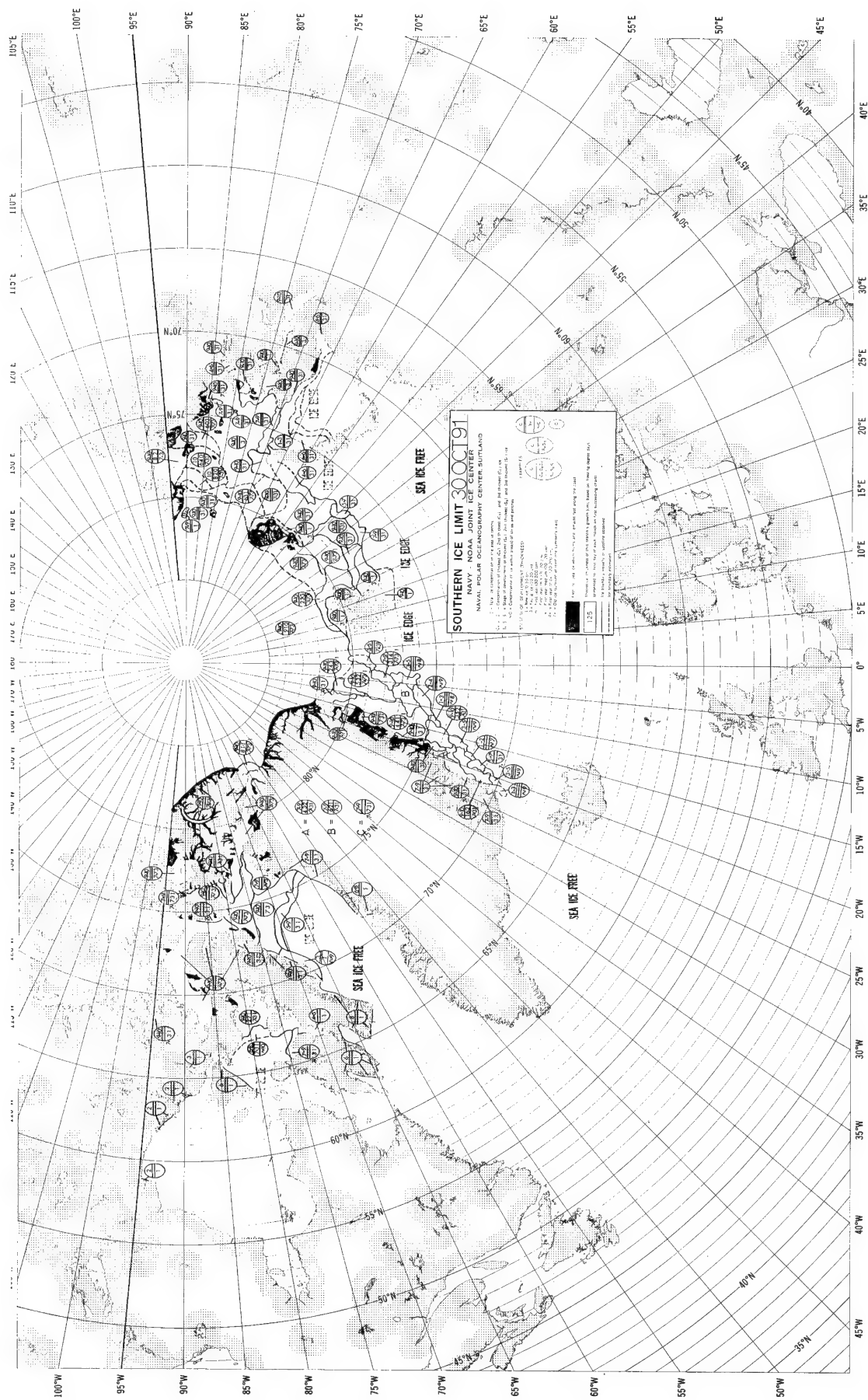


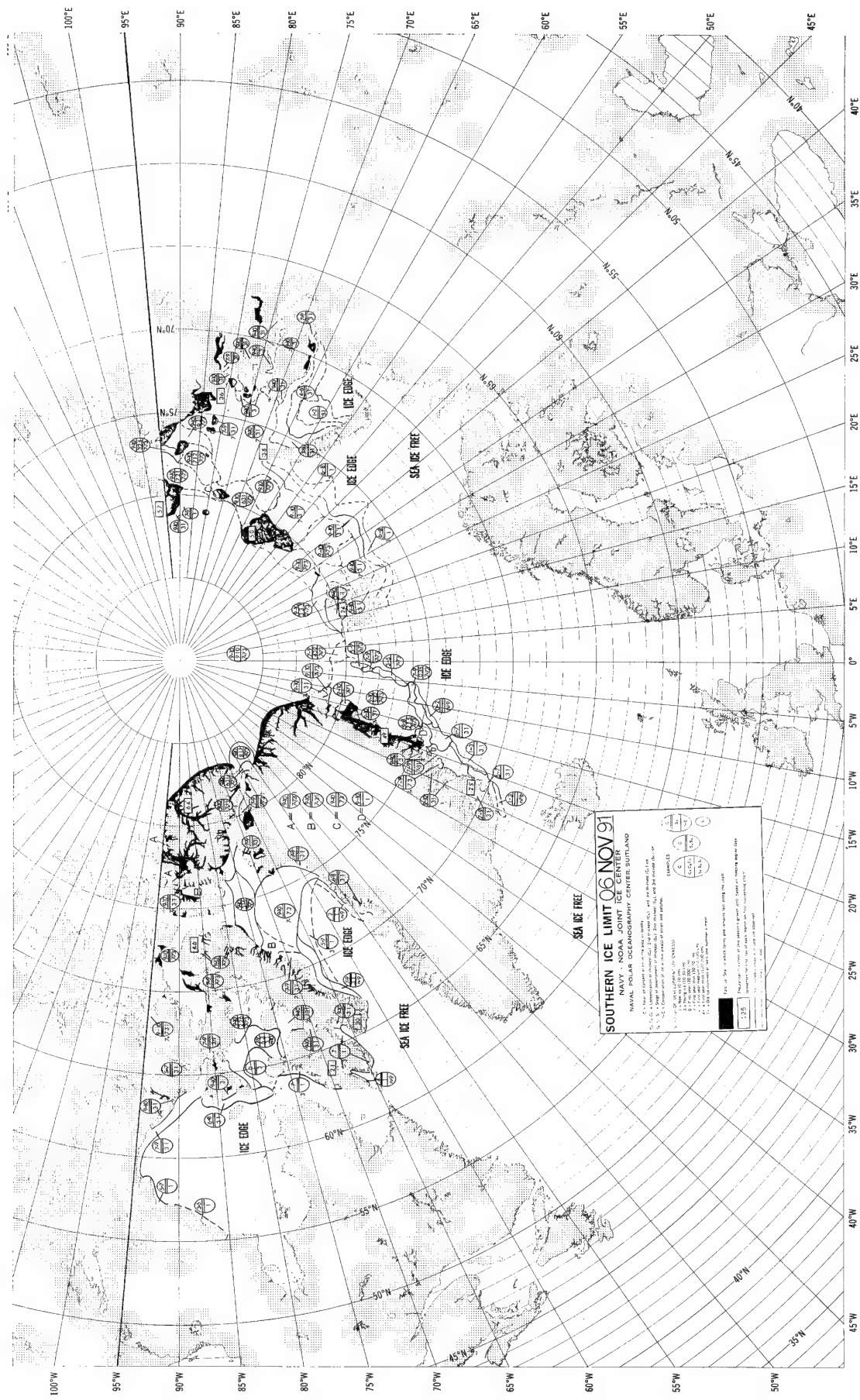








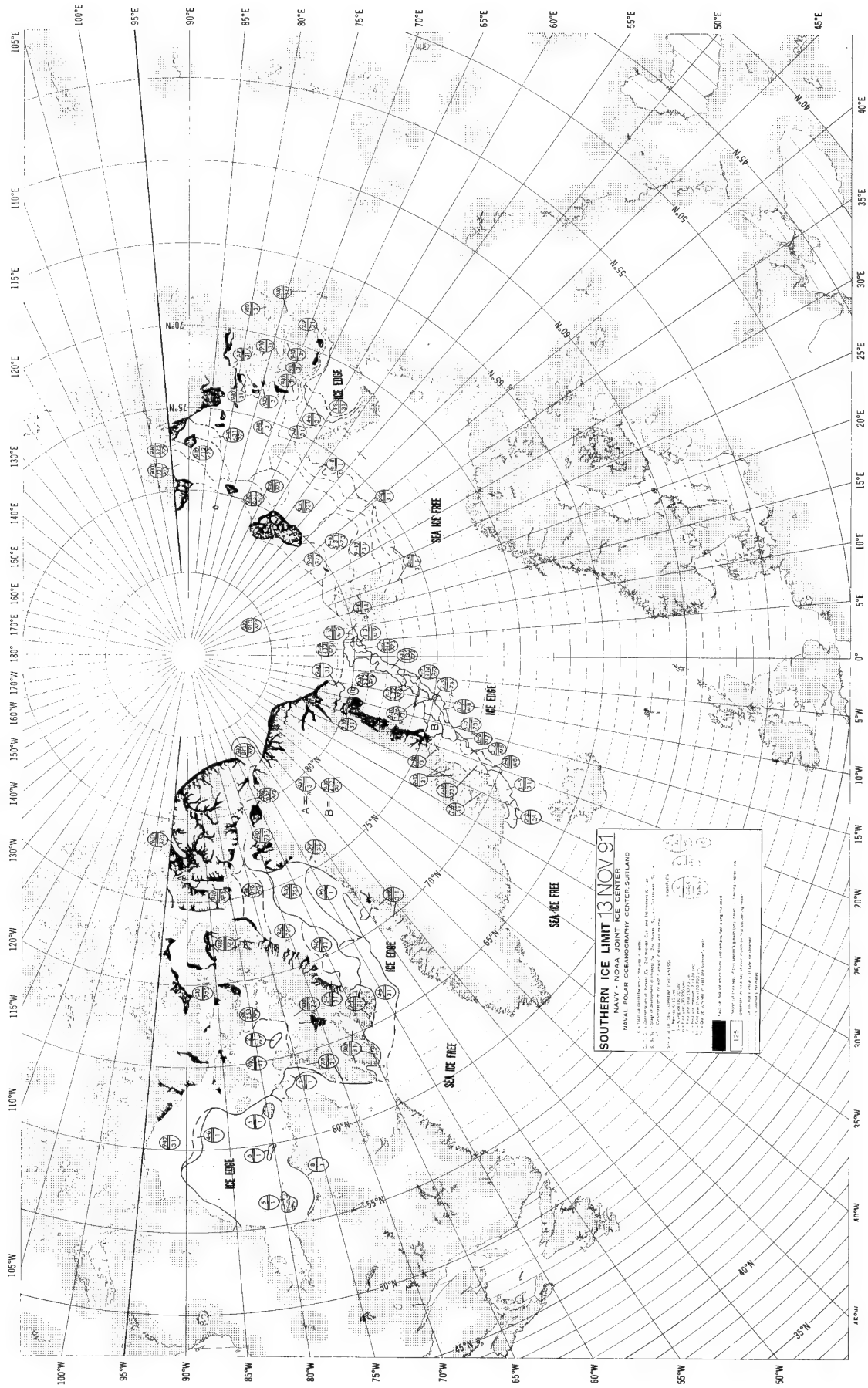


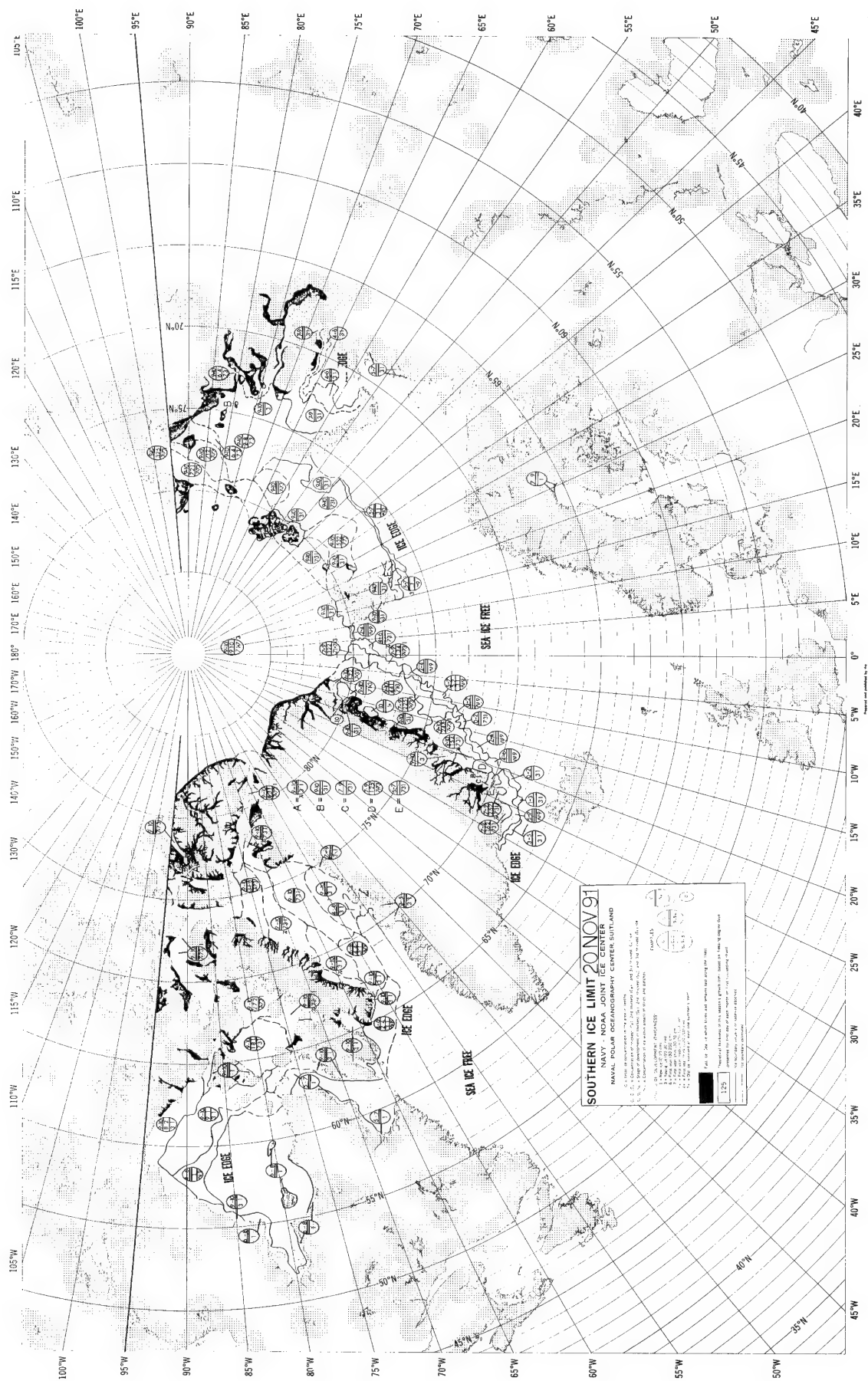


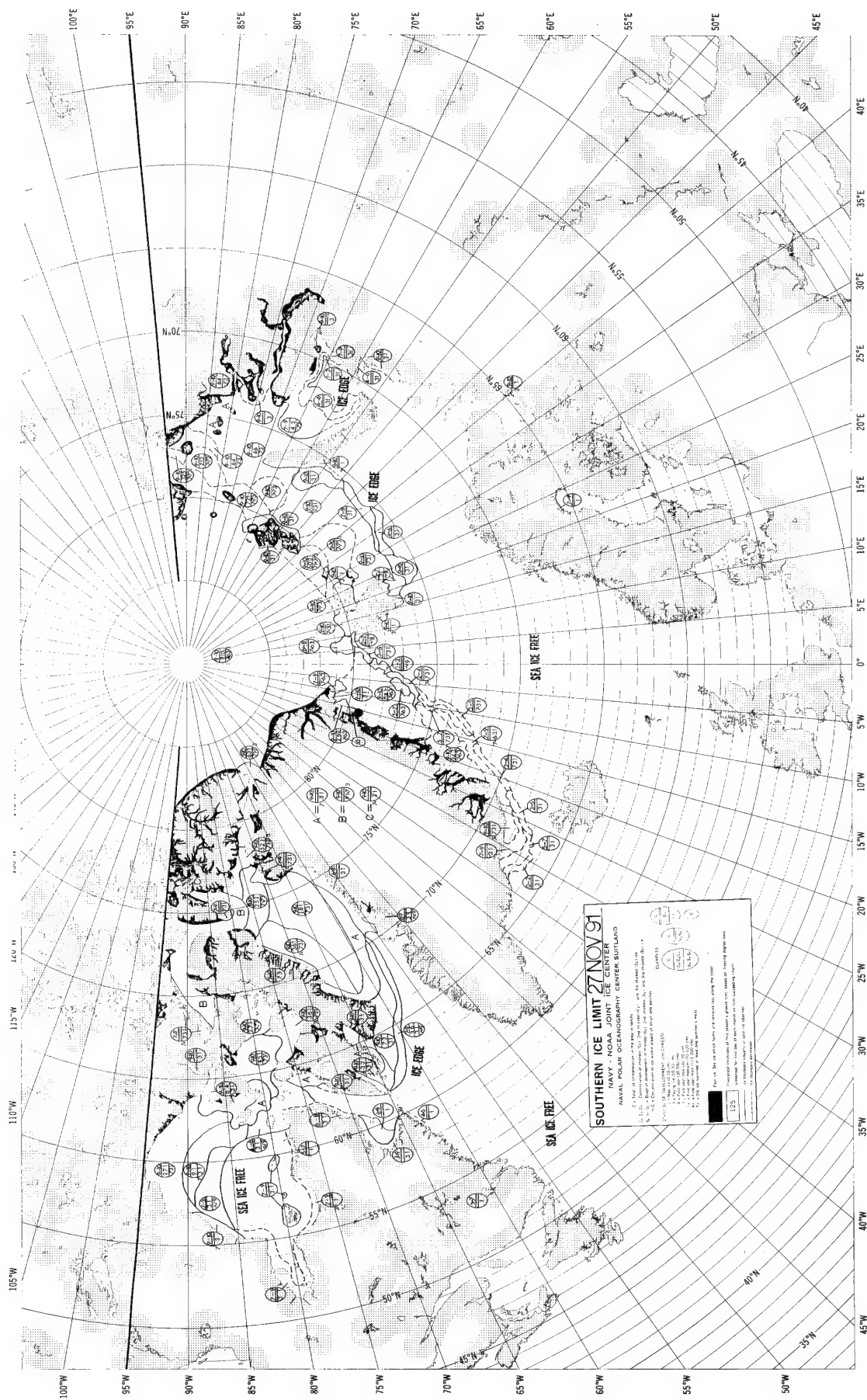
SOUTHERN ICE LIMIT 06 NOV 91
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

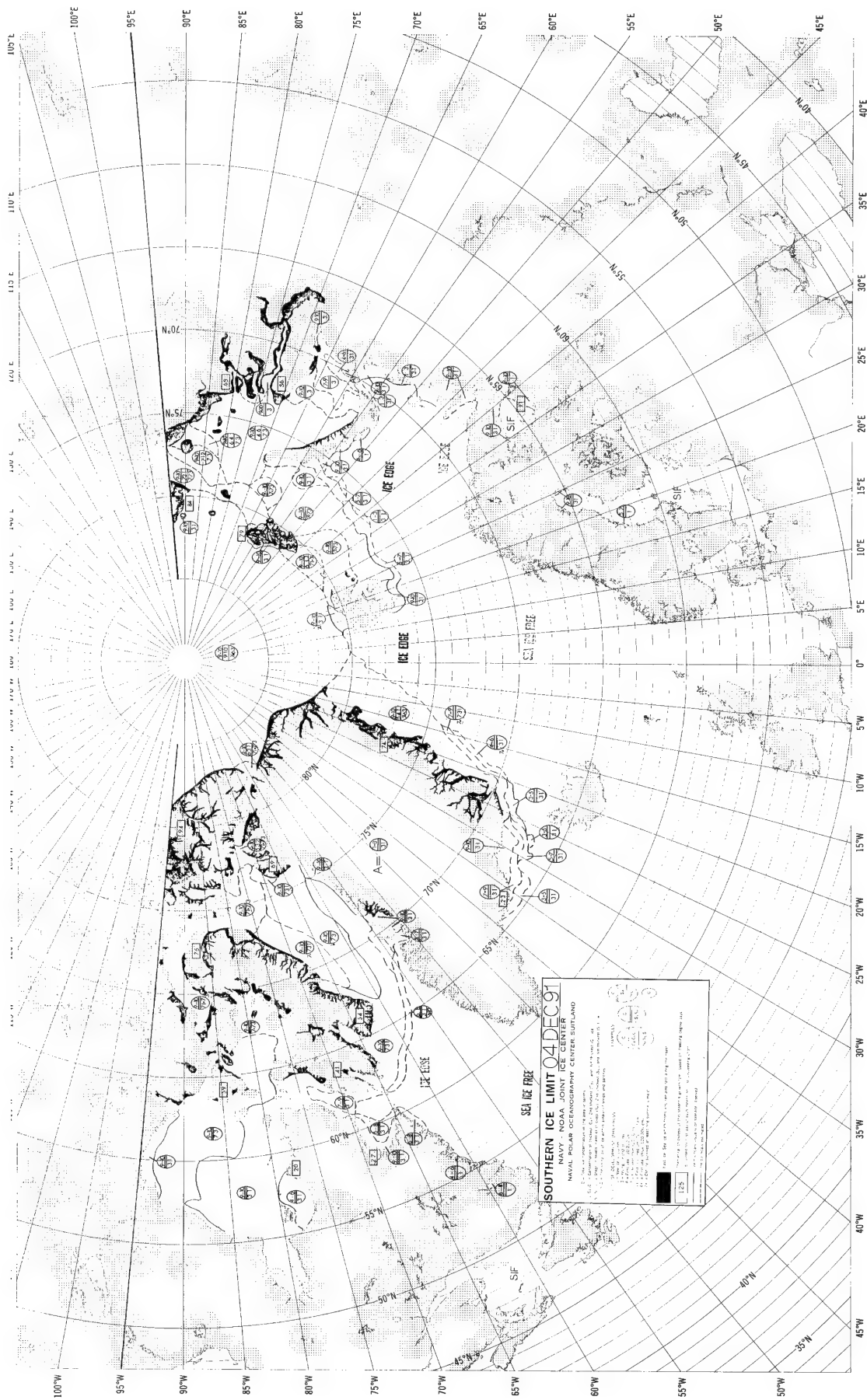
Legend:
A - Ice edge, as reported in the report to the center.
B - Ice edge, as reported in the report to the center, but not confirmed by the center.
C - Ice edge, as reported in the report to the center, but not confirmed by the center, and not reported by the center.
D - Ice edge, as reported in the report to the center, but not confirmed by the center, and not reported by the center, and not reported by the center.

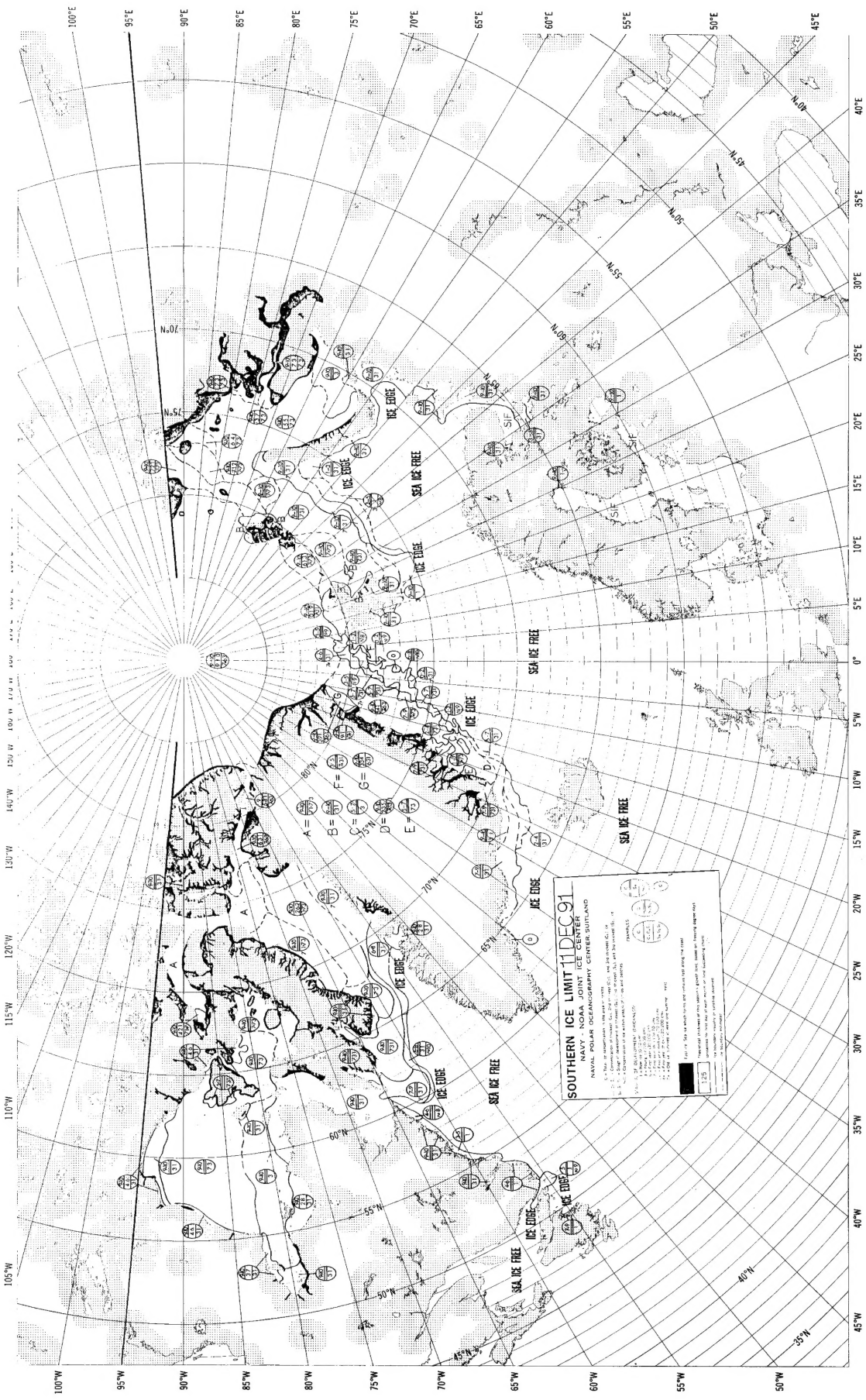
EXAMPLES:
A - Ice edge, as reported in the report to the center.
B - Ice edge, as reported in the report to the center, but not confirmed by the center.
C - Ice edge, as reported in the report to the center, but not confirmed by the center, and not reported by the center.
D - Ice edge, as reported in the report to the center, but not confirmed by the center, and not reported by the center, and not reported by the center.











SOUTHERN ICE LIMIT 11DEC91
NAVY - NOAA JOINT ICE CENTER
NAVY POLAR OCEANOGRAPHY CENTER DAVENPORT

1. This chart is a representation of the ice limit data received from the Navy and NOAA. It is not a forecast and should not be used for navigation purposes.

2. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

3. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

4. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

5. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

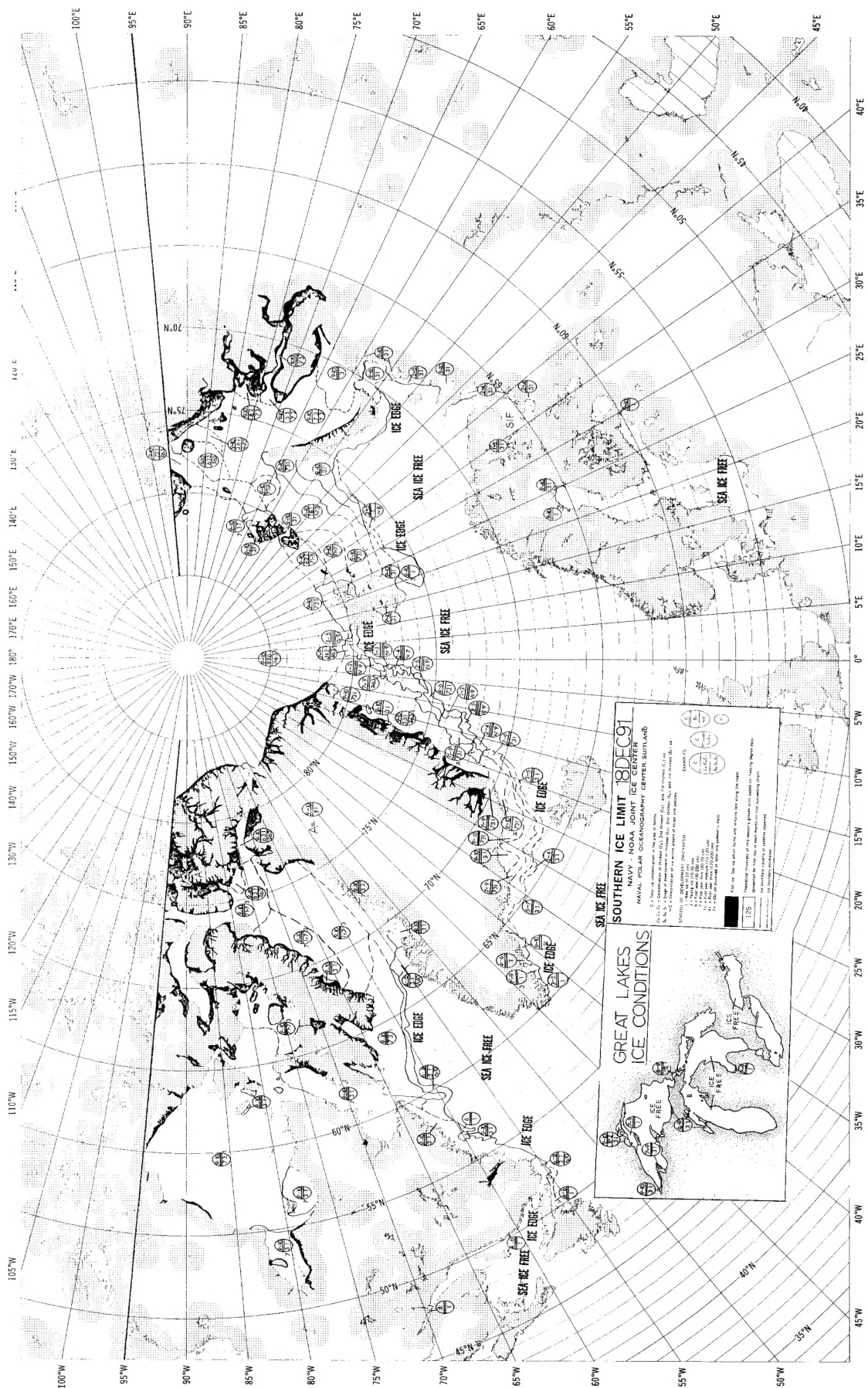
6. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

7. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

8. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

9. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.

10. The ice limit is defined as the outer edge of the ice field. It is not the edge of the ice field that is closest to the coast.



SOUTHERN ICE LIMIT 18DEC91
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

1. This map is a representation of the ice limit in the Southern Ocean, based on the latest available data from the Navy and NOAA.

2. The ice limit is defined as the boundary between the ice-covered and ice-free areas of the Southern Ocean.

3. The ice limit is shown as a solid line, with the area to the north of the line being ice-free and the area to the south being ice-covered.

4. The ice limit is based on data from the Navy and NOAA, and is subject to change as more data becomes available.

5. The ice limit is shown for the date 18DEC91.

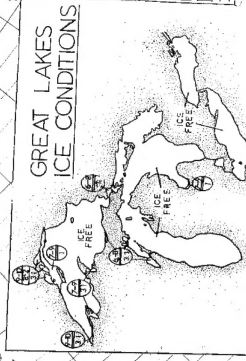
6. The ice limit is shown for the area from 45°S to 40°N and 105°W to 45°E.

7. The ice limit is shown for the area from 45°S to 40°N and 105°W to 45°E.

8. The ice limit is shown for the area from 45°S to 40°N and 105°W to 45°E.

9. The ice limit is shown for the area from 45°S to 40°N and 105°W to 45°E.

10. The ice limit is shown for the area from 45°S to 40°N and 105°W to 45°E.



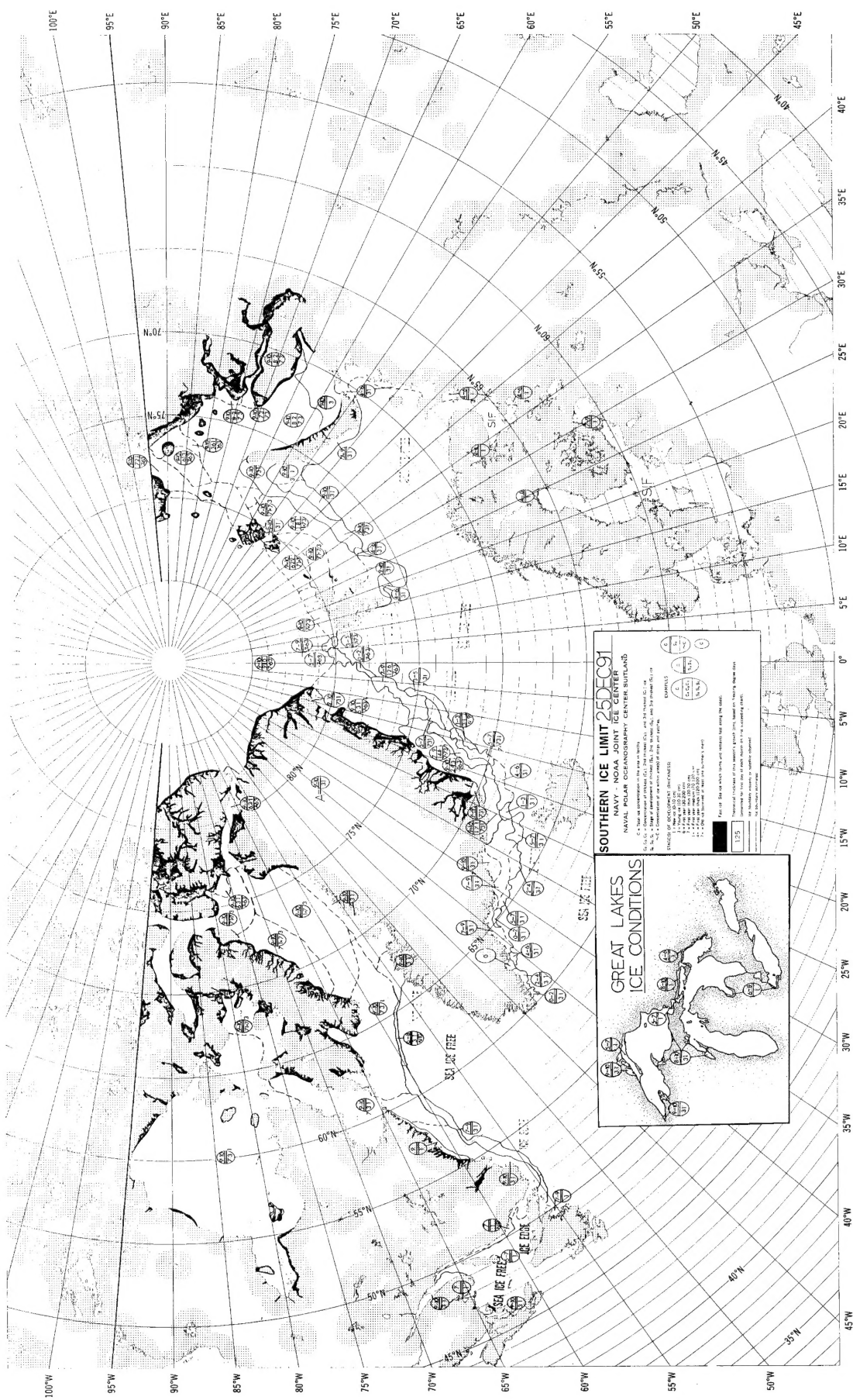


TABLE 1. SATELLITE DATA UTILIZED DURING 1991 (ARCTIC)

Time period		Satellite Remote Sensing			
From	To	Sensor Platform	Sensor Type	Spectral Region	Resolution Coverage
1-91	9-91	NOAA-10	AVHRR HRPT/LAC VIS NIR IR	0.58-0.68 um 0.725-1.10 um 10.5-11.5 um	1 km Regional
			GAC VIS IR	0.58-0.68 um 10.5-11.5 um	4 km Global
1-91	12-91	NOAA-11	AVHRR HRPT/LAC VIS NIR IR	0.58-0.68 um 0.725-1.10 um 10.5-11.5 um	1 km Regional
			GAC VIS IR	0.58-0.68 um 10.5-11.5 um	4 km Regional
1-91	12-91	DMSP-F (10/11)	OLS VIS IR SSM/I MW	0.4-1.1 um 10.2-12.8 um 1.55 cm (19.35 GHz) 0.81 cm (37.0 GHz)	.62 km Regional .62 km Regional 50 km Global 35 km Global
9-91	12-91	NOAA-12	AVHRR HRPT/LAC VIS NIR IR	0.58-0.68 um 0.725-1.10 um 10.5-11.5 um	1 km Regional

Abbreviations and Acronyms

AVHRR - Advanced Very High Resolution Radiometer
 cm - Centimeter
 GAC - Global Area Coverage
 GHz - Giga-hertz
 HRPT - High Resolution Picture Transmission
 IR - Infrared
 km - Kilometer
 LAC - Local Area Coverage
 MW - Microwave
 NIR - Near Infrared
 OLS - Operational Line Scan System
 SSM/I - Special Sensor Microwave Imager
 um - Micrometer
 VIS - Visible